Food and Agriculture Organization of the United Nations

Ethiopia

Building resilience to climate change-related and other disasters in Ethiopia

Challenges, lessons and the way forward

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Foreword

The Food and Agriculture Organization of the United Nations (FAO) is committed to supporting countries in their quest for more efficient, inclusive, resilient and sustainable agrifood systems. As articulated in the FAO Strategic Framework 2022–2031, the world in general and developing countries in particular are facing escalating and overlapping threats – ranging from natural disaster risks and human-induced hazards. These require our immediate, informed and coordinated response to safeguard livelihoods and transform our agrifood systems.

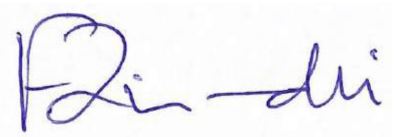
Ethiopia is among the developing countries that have been experiencing increase in the magnitude, frequency and impact of disasters. These events have eroded the foundation of livelihoods among the most affected communities.

FAO has commissioned this institutional and policy analysis for resilience-building in Ethiopia in order to support the Government of Ethiopia in its efforts to respond to these multiple disaster risks through short-term humanitarian response and long-term resilience-building initiatives as stipulated in FAO Strategic Framework 2022–2031, specifically the programme priority area on Resilience of livelihoods and agri-food systems to natural and man-made shocks.

An in-depth review of policy documents, reports and academic literature has confirmed that Ethiopia is among the countries most vulnerable to natural hazards and human-induced disasters, the majority of which are associated with climate change and variability, resource degradation and conflict. The report also highlights the efforts made to build disaster risk reduction institutions ; as well as to manage and adopt policies and strategies in the last 50 years or so. Furthermore, in the light of the findings, the report proposes potential measures that can systematically ensure sustainable resilience of household to natural and human-induced disaster risks.

The proposed pathways include conflict management and peace-building, promotion of public and private investment in agriculture and natural resources, reduction of disaster risks and adaptation to climate change, promotion of access to input and output markets, strengthening disaster risk governance structures, and due emphasis on the most vulnerable groups and environment.

We hope this report will add weight to the arguments for action on building resilience, as well as focusing on the overall attainment of the sustainable development goals. Clearly, the attainment of the vision of a more resilient and prosperous Ethiopia requires the efforts of all: Government, development partners, stakeholders, private sector and citizens.



Farayi Zimudzi
FAO Representative, Ethiopia

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This document was prepared by a team of consultants, namely, Ayalneh Bogale and Manzamasso Hodjo. The consultants wish to express their profound gratitude to FAO for entrusting them with this important assignment of documenting experience of Ethiopia in building resilience to natural hazards and human-induced disaster risks, what has been achieved during the last 50 years or so to build institution, adopt policies and strategies, mainstream disaster risk management (DRM) into various national and sectoral plans and programmes, and make suggestions on the strategic pathways to improve effectiveness of responses to multiple shocks. Since the task of collecting the relevant information and documents was done virtually, we are grateful to a number of individuals who were most generous in responding to our informal request and provided views and suggestions. The report also benefited enormously from in-depth and critical review of various FAO experts based at FAO headquarters, the Regional Office for Africa, the Subregional Office for Eastern Africa and FAO Ethiopia, and the Subregional Resilience Team for West Africa and the Sahel. Specifically, we greatly appreciate Jean Senahoun for his leadership during the initiation and drafting of the report, Coumba Sow for sustaining the momentum, and Abeshaw Gebru who professionally guided and facilitated the entire work. The insightful comments, technical inputs and professional advice the consultants received from Amare Mengiste, Rebeca Koloffon, Tamara Van'tWout, Frederique Matras, Wirya Khim, Oscar Ngesa, Assad Bori, Dervla Cleary and Ousmane Diabre on the draft document were very critical to shape the final report. The consultants would like to highly appreciate them for taking their time to review the draft document and provide critical and professional suggestions and comments. Even though we made every effort to incorporate their suggestions, we still take full responsibility for unintended omissions and errors.

Thank you.

Ayalneh Bogale and Manzamasso Hodjo
The Consultants

Abbreviations and acronyms

AGIR	Global Alliance for Resilience in Sahel and Western Africa
ASAL	arid and semi-arid lands
CILSS	Permanent Interstate Committee for Drought Control in the Sahel
CH	Cadre Harmonise
CPP	country program paper
CRGE	climate-resilient green economy
DRM	disaster risk management
DRMKC	European Commission Disaster Risk Management Knowledge Centre
DRR	disaster risk reduction
DRMFSS	disaster risk management and food security sector
DRM-SPIF	Disaster Risk Management Strategic Programme and Investment Framework
DPPA	Disaster Prevention and Preparedness Agency
DPPC	Disaster Prevention and Preparedness Commission
ECOWAS	Economic Community of West African States
EWRD	Early Warning and Response Directorate
EWS	early warning system
FAO	Food and Agriculture Organization of the United Nations
FSCD	Food Security Coordination Directorate
GoE	Government of Ethiopia
GTP	Growth and Transformation Plan
HFA	Hyogo Framework for Action
IDDRSI	IGAD Drought Disaster Resilience and Sustainability Initiative
IGAD	Intergovernmental Authority on Development
LSMS	living standard measurement study
NDPPS	National Disaster Prevention and Preparedness Strategy
NDRMC	National Disaster Risk Management Commission
NPDPM	National Policy on Disaster Prevention and Management
NPSDRM	National Policy and Strategy on Disaster Risk Management
NGO	non-governmental organization
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PCDP	Pastoral Community Development Project
PSNP	Productive Safety Net Programme
REDFS SWG	Rural Economic Development and Food Security Sector Working Group
RPCA	Food Crisis Prevention Network
RPLRP	Regional Pastoral Livelihood Resilience Project
RRC	Relief and Rehabilitation Commission
SDG	Sustainable Development Goal
TANGO	Technical Assistance for NGOs
USAID	United States Agency for International Development
UNISDR	United Nations International Strategy for Disaster Reduction
WDRP	Wereda Disaster Risk Profiling

Executive summary

The objective of this study on "Building resilience to climate change-related and other disasters in Ethiopia: challenges, lessons and the way forward" is to review and document strategic interventions by the Government of Ethiopia in terms of adopting policies, strategies and programmes; building the necessary institutional infrastructure; and mainstreaming disaster risk management into various sectors and national development and budgeting process – all of which contributed to building resilience to natural hazards and human-induced disasters and quick recovery in recent years. It also tries to highlight some of the drivers of effective responses towards building resilience.

There is compelling evidence that document the effects of natural and human-induced disasters mainly attributed to climate change, increasing resource scarcity and degradation and conflict in Ethiopia. Even though the intensity of droughts may vary over the years, the droughts of 1972/73, 1984/85, 2010/11 and 2015/16 have significant place in Ethiopian history. During the 1972/73 drought, an estimated 2 million people in northern Ethiopia were affected, about 250 000 of whom died of famine (Graham *et al.,* 2013). Whereas the 2015/16 drought was considered to have been the most severe drought in Ethiopia in the last 50 years with larger geographical coverage and devastated crop and livestock productions, Ethiopia did not suffer from a major famine-related death. This clearly indicates that investments made in building resilience in terms of establishing proper disaster risk management institutions, policies and strategies have started to pay off.

In an effort to counter the dehumanizing effects of recurrent natural and human-induced disasters, the Government of Ethiopia (GoE) responded by establishing a Relief and Rehabilitation Commission (RRC) in 1974 that has undergone various institutional reforms to respond to changing circumstances and better understanding of disaster risk management and resilience-building. Even though the RRC was established primarily to coordinate humanitarian responses to the 1972/73 drought, its current form, the National Disaster Risk Management Commission (NDRMC) is believed to have significantly strengthened the legal and operational frameworks for a comprehensive and integrated national Disaster Risk Management (DRM) system at national and local levels. The NDRMC is responsible for coordinating early warning, disaster response, risk management, preventive measures and recovery programmes in the country, and functions through a well-established organizational structure with clearly defined duties and responsibilities.

Furthermore, the GoE has developed and adopted various policies and strategies that have contributed towards strengthening resilience to natural and human-induced disasters. Starting with the adoption of the National Disaster Prevention and Preparedness Strategy (NDPPS) in 1989, relevant policies and strategies were updated periodically to accommodate better understanding of the circumstances and lessons learned over time with regard to response measures and approaches. Furthermore, mainstreaming DRM in major sectoral policies, including agriculture, food security and other pro-poor sectors has remained at the centre stage of the latest 2013 policy document.

The overall impact of these institutional and policy interventions can be better explained with some empirical findings. Making use of the secondary data from the World Bank Living Standards Measurement Study–Integrated Surveys on Agriculture (LSMS-ISA) for 2011 and 2018 and the resilience index measurement and analysis (RIMA) tool to estimate resilience capacity index (RCI), the report highlights changes observed at household level not only with respect to RCI but also its four pillars, namely access to basic services (ABS), assets (AST), social safety nets (SSN) and adaptative capacity (AC).

Resilience-building in Ethiopia is enhanced by the factors that drive transformation such as sustained economic growth, human capital development, improved governance, and political and economic

inclusion. Since the mid-1990s, Ethiopia has pursued policies and strategies that have helped the country to realize strong economic growth, relatively successful macroeconomic stabilization, major investments in the welfare and livelihoods of its people, significant national poverty reduction and increased resilience to shocks.

Furthermore, the Productive Safety Net Programme (PSNP) is one of the GoE's flagship reform programmes and represents a significant transformation of the government's strategy for providing transfer to food-insecure households in chronically food-insecure regions in a way that prevents asset depletion at the household level while stimulating local markets, improving access to services, rehabilitating and enhancing the natural resources and the environment. The GoE and its development partners have also recognized the need to build resilience of households and communities in arid and semi-arid regions of the country. Strengthening the early warning system through capacity-building and technology and enabling relatively large amount of data to be collected continuously to monitor food production and other key indicators can feed into decision-making processes for classification of affected areas and relief allocation with adequate lead time.

Finally, based on the lessons earlier mentioned, the report suggests potential measures to be undertaken to further strengthen the resilience of households to natural and human-induced disasters, including, but not limited to, non-violent resolution of conflicts and peacebuilding; promotion of public and private risk- and conflict-sensitive investment in agriculture and natural resources to improve agricultural productivity and production, which contributes to reducing poverty and vulnerability as well as root causes of risks; promotion of adaptation to climate change; enhancement of access to inputs and output market; strengthening of governance structure; and more emphasis on including the most vulnerable groups and environment.

1. Introduction

1.1. Background

Ethiopia is exposed to a wide range of disasters associated with the country's extensive dependence on rainfed subsistence agriculture, climate change, resource degradation, diverse geoclimatic and socio-economic conditions and conflicts. Drought and floods are the major challenges, but a number of other threats affect communities and livelihoods. These include conflict, desert locust, fall armyworm, frost and hail, crop pests and diseases, livestock diseases, human diseases, landslides, earthquakes, and urban and forest fires.

Every source of evidence suggests that Ethiopia would feel the human and economic impacts of climate change intensely, and the impacts will only continue to grow if the country continues a business-as-usual approach to crisis response, and will not be able to manage the increasing scale of the challenges. Thus, there is call by all stakeholders for a paradigm shift in the way the country deals with communities at risk, in order to take preventive actions to reduce exposure, vulnerability and impact at local level. This requires moving away from a reactive system that solely focuses on drought and supply of life-saving humanitarian relief and emergency responses during disasters to a comprehensive proactive disaster and climate risk management approach, including climate change adaptation, among which are interventions to enhance livelihood diversification, social protection programmes and risk transfer mechanisms.

Furthermore, resilient agrifood systems support should include a range of proven interventions that are context-relevant and cover the whole agrifood system, such as increase in fertilizer use where appropriate and high-yielding and drought-tolerant seeds, strengthened extension and advisory systems at the *kebele* (local) level through the use of farmer field schools and pastoral field schools, expansion of access to credit, livelihood diversification, risk transfer mechanism and institutional development that link short-term emergency relief to long-term development pathways. This approach is essential for building resilience to natural hazard and human-induced disasters resulting in food insecurity challenges.

Much progress has been made in the last 50 years in the way of managing mainly drought disaster risks. Large-scale prevention and mitigation programmes have been designed, incorporating a focus on vulnerabilities, household asset-building, and public works for environmental rehabilitation and generation of livelihoods. Preparedness has been enhanced by the development of various policies and strategic documents for assessment and intervention, early warning and response systems, and economic, social and physical infrastructure to strengthen the local economy and household livelihoods. An attempt has also been made for humanitarian response to count on an established risk-financing mechanism, better coordination and improved resource management and prioritization. This section of the report includes background information and a brief description of the objectives, methodology, structure and practical arrangements relevant for the assignment.

1.2. Objectives and methods

The FAO Strategic Framework 2022-2031 articulates the Organization's vision of a sustainable agrifood system that allows for sufficient production and consumption of food by all, in the context of the Agenda 2030 for Sustainable Development. This study on building resilience to multiple disaster risks in Ethiopia is motivated by Priority Programme Areas BL4: Agriculture and food emergencies and BL5: Resilient agrifood systems of the FAO Strategic Framework. Based on the aforementioned brief background, the main objective of the study was to review and document strategic interventions by the Government of Ethiopia in terms of adopting policies, strategies

and programmes, building the necessary institutional structures/systems and infrastructure, mainstreaming disaster risk management into various sectors and national development and budgeting processes – all of which contributed towards mitigating the negative consequences of natural hazards and human-induced disasters and quick recovery in recent years.

The study includes a critical review, extensively drawing from various documents released by the Government of Ethiopia, development partners, and international non-governmental organizations and researchers, conversations with key officers and experts, and the personal experience of the authors. Furthermore, an in-depth scrutiny of the challenges related to food insecurity and lessons learned from best intervention practices will be presented to trigger and direct future actions and scale up best practices in building resilience to climate-related and other disasters in Ethiopia and other countries.

1.3. Conceptual framework: understanding resilience to natural hazards and human-induced disasters

Ethiopia remains highly vulnerable to climate shocks and climate change as manifested in recurrent droughts that have become more and more intense and frequent, exposing millions of people to food insecurity. The food insecurity condition has also worsened due to resource degradation, very low agricultural productivity and minimal adaptive capacity of the vulnerable communities. These recurrent droughts and ever worsening food insecurity conditions has resulted in collective recognition that treating the protracted and complex crisis in Ethiopia as a series of recurrent acute emergencies was not the most appropriate approach, not to mention the fact that it is unsustainable and extremely costly. Thus, the GoE advocated and facilitated for deliberately linking emergency humanitarian assistance to multiyear and multisectoral comprehensive approaches that not only address urgent needs but also enable households and communities to register development outcomes in terms of increased income, assets, human capital, infrastructure and setting up functioning institutional arrangements. This shift in paradigm was the basis for building resilience to natural and human-induced disasters.

It is important, however, to acknowledge that, in reference to resilience, different conceptual perspectives exist and they may vary both globally as well as locally. The concept of resilience has been defined, researched and debated across many academic disciplines as well as operational sectors and agencies, and has grown increasingly popular in recent years in development and policy discourse (Dubois and Krasny, 2016; Meerow, Newell and Stults, 2016). This study adopts the conceptual framework and definition of resilience proposed by FAO (2021a) as “the ability to prevent disasters and crises as well as to anticipate, absorb, accommodate or recover from them in a timely, efficient and sustainable manner. This includes protecting, restoring and improving livelihoods systems in the face of threats that impact agriculture, nutrition, food security and food safety.” FAO (2021b) makes specific emphasis to agrifood systems’ resilience and define it as the capacity over time of agrifood systems, in the face of any disruption, to sustainably ensure availability of and access to sufficient, safe and nutritious food for all, and sustain the livelihoods of agrifood systems’ actors. Box 1 presents the other most widely used definitions by development and humanitarian agencies, including the conceptualization and definition of resilience by UNDRR, DFID (now known as the Foreign, Commonwealth and Development Office (FCDO)) and USAID.

Box 1: Alternative definitions of resilience

UNISDR (2005) defines resilience as "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions". DFID (2011) defines it as "the ability of countries, communities, and households to manage change, by maintaining or transforming living standards in the face of shocks or stresses such as earthquakes, drought or violent conflict, without compromising their long-term prospects". USAID (2012), on the other hand, expresses resilience as "the ability of people, households, communities, countries and systems (social, economic, ecological) to mitigate, adapt to, recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth". Furthermore, to advance a harmonized understanding and application of the concepts of risk and resilience across sustainable development, humanitarian, peace and security and human rights efforts of the United Nations (UN) system, as a basis to promote coherent and holistic analysis and joint planning, the UN has developed and adopted the UN Common Guidance on Helping Build Resilient Societies (UN, 2020) and defines resilience as "the ability of individuals, households, communities, cities, institutions, systems and societies to prevent, anticipate, absorb, adapt, and transform positively, efficiently and effectively when faced with a wide range of risks, while maintaining an acceptable level of functioning and without compromising long-term prospects for sustainable development, peace and security, human rights and well-being for all."

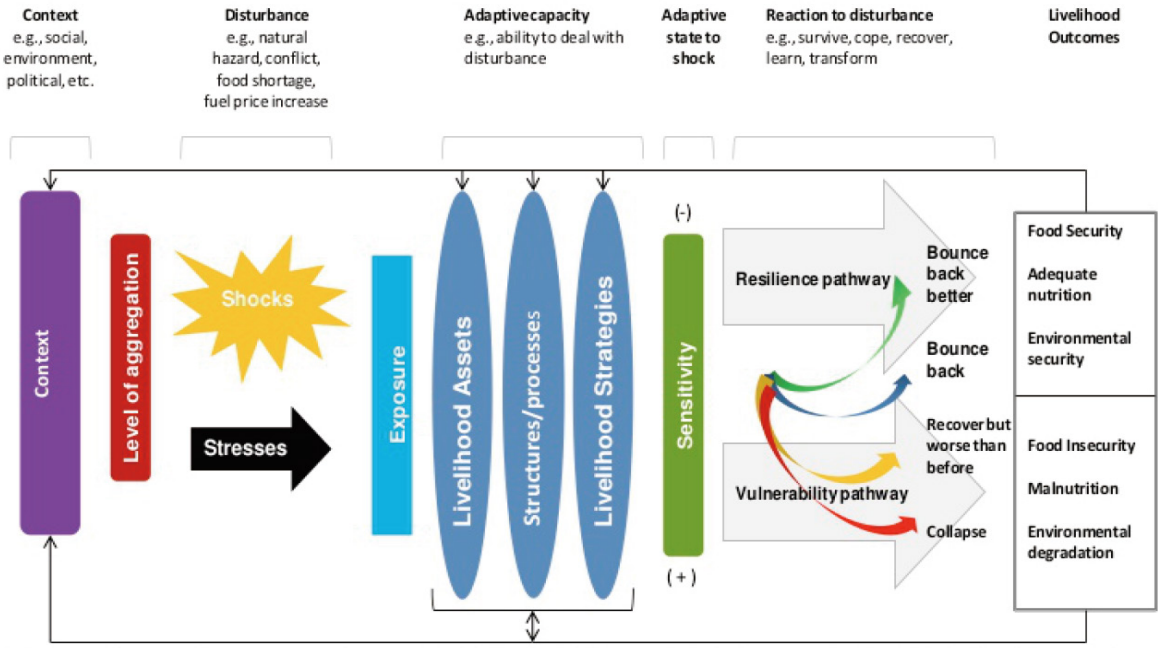
Source: Compiled by authors. Citations in refrences.

Expressed one way or the other, all the definitions above have something in common: that resilience can be best described by five crucial capabilities, according to UN (2017 and 2020) and FAO (2021b):

i. **Anticipative capacity:** The ability to take early action in anticipation of a potential threat to reduce its potential negative impacts, including through early warning, early action and forecast-based financing.
ii. **Preventive capacity:** The ability to implement activities and take measures to reduce existing risks and avoid the creation of new risks. While certain risks cannot be eliminated, preventative capacity aims at reducing vulnerability and exposure in such contexts where, as a result, the risk is reduced.
iii. **Absorptive capacity:** The ability to take protective action and 'bounce back' after a shock, using predetermined responses to preserve and restore essential basic structures and functions. It involves anticipating, planning, coping and recovering from shocks and stresses.
iv. **Adaptive capacity:** The ability to make incremental adjustments, modifications or changes to the characteristics of systems and actions to moderate potential changes, in order to continue functioning without major qualitative changes in function or structural identity.
v. **Transformative capacity:** The ability to create a fundamentally new system when ecological, economic or social structures make the existing system untenable. Transformative capacity is required when the change needed goes beyond the system's anticipatory, absorptive, adaptive and preventive abilities and when there is recognition that ecological, economic or social structures keep people trapped in a vicious circle of poverty, disasters and conflict and make the existing system unsustainable.

The DFID (2011) resilience framework as adapted by the Technical Assistance to NGOs (TANGO) is relevant here to summarize our conceptual framework for this study. As presented in Figure 1, we can scrutinize how communities and households can build resilience to certain shocks and stresses while at the same time building a system's adaptive capacity to respond to the disturbances. The response then determines the direction of resilience or vulnerability pathways that the system will take following exposure based on its sensitivity to the disturbance.

Figure 1: The Resilience framework



Source: DFID, 2011. Accessed on 4 May 2021.

1.4. Disaster Risk Management in Ethiopian context: a brief recap

Ethiopia is exposed to a wide range of disaster risks associated with diverse geography, climate, and socio-economic conditions. Droughts and floods are the major challenges, but a number of other disasters, such as conflicts, outbreak of crop pests, specifically desert locust and fall armyworm, livestock and human diseases, landslides and fires, also affect communities and their livelihoods and the country at large.

Even though Ethiopia has a long history of recurrent droughts, a formal DRM structure can only be traced back to the drought and famine of 1973/74. Until 1973, there was no organized disaster management institution and, therefore, response to crisis up until then was ad hoc. The first formal government disaster management institution was established in 1974 with the establishment of the Relief and Rehabilitation Commission (RRC) with a mandate to provide relief assistance to drought-affected people in Wollo and Tigray provinces. The RRC was subsequently transformed into Disaster Prevention and Preparedness Commission (DPPC) in 1995 after the ramification of the first National Policy on Disaster Prevention and Management (NPDPM) in 1993.

DPPC had the responsibility of providing support to disaster-affected populations, particularly for those affected by severe drought. Even though some research findings reported that RRC achieved impressive standards in its implementation of relief measures (De Waal, 1997), it had also suffered from shortcomings and gaps. One example was the lack of an early warning system (EWS) as a crucial component of disaster risk management. This gap become apparent when it was reported that more than 250 000 people died in the central and northern highland areas of the country following

the 1983/84 famine, which was also one of the first drought and famine incidences in Ethiopia to be internationally televised. The lack of a national preparedness strategy and the absence of an effective EWS revealed a pressing need to concentrate and strengthen the government's capacity to produce early warning information upon which to base its impact mitigation and response measures for future emergencies. This prompted the Government of Ethiopia to rename DPPC to Disaster Prevention and Preparedness Agency (DPPA) in 2004, with a revised mandate to focus on emergency response.

Though DPPA had been practically relief-oriented and therefore was quite effective in saving lives, its contribution to reduce vulnerability to disaster risks as well as build resilience to recover from shocks was considered low. Consequently, in 2008, the power and responsibility of the DPPA shifted to the then Ministry of Agriculture and Rural Development (MoARD). MoARD established the Disaster Risk Management and Food Security Sector (DRMFSS) that comprised two directorates: the Early Warning and Response Directorate (EWRD) and the Food Security Coordination Directorate (FSCD) in 2007.

This has brought about a paradigm shift in direction and led to doing business differently by moving away from a strategy that mainly focused on drought and supply of life-saving relief emergency assistance during disaster to a comprehensive disaster risk management approach. Unlike in the past, this approach is implemented with the aim of reducing disaster risks and potential consequences of disasters by providing appropriate and timely responses to disasters before, during, and after the disaster period at all levels through establishment of a coordinated, accountable, and decentralized system.

In 2013, the government passed another proclamation that changed the DRMFSS to the National Disaster Risk Management Commission (NDRMC) and empowered it with much more authority and broader mandates. This prompted preparation and adoption of the National Policy and Strategy on Disaster Risk Management (NPSDRM) in 2013. Being cognizant of the fact that global humanitarian actors are often criticized for creating parallel structures and undermining existing systems, the NDRMC has been mandated to act as a central body for the coordination and implementation of all of the government's disaster risk management efforts. All humanitarian assistance, both local and international, was supposed to be coordinated and channelled through the commission. In this way, it was possible to minimize this common pitfall in Ethiopia because the Government of Ethiopia actively assumed and defended its leadership role (IAHE, 2019). The close integration of the international humanitarian and government response was widely seen as key to explaining successes of the drought response in recent years. The recent humanitarian crisis, triggered mainly by conflict, and the need to effectively and timely respond to millions of internally displaced people associated with it, has prompted the government to move the NDRMC from the MoA to Ministry of Peace (MoP).

1.5. Linking disaster risk reduction to resilience-building in Ethiopia

Ethiopia is exposed to a wide range of disaster risks, both natural and human-induced. The successive droughts had strong and undesirable effects on poverty, food security, livelihood status and human capital formation of communities during the past few years. Vulnerability factors such as unemployment, undernourishment, population pressure, lack of access to resources and inputs, land degradation and low productivity in agriculture have further worsened the situation for many, mostly in rural areas. These vicious cycles of protracted hazards and food insecurity have diverted scarce national resources to emergency humanitarian relief and, in the long term, have the potential to derail development gains of the past few years.

Thus, the Government of Ethiopia recognized the importance of linking humanitarian aid to long-

term development and resilience-building so that communities and households in vulnerable areas acquire enhanced ability to manage shocks and stresses without compromising their future well-being. Even though the pioneering strategic document of the GoE in this respect is the Ethiopia's Climate-Resilient Green Economy (CRGE) strategy adopted in 2011, the foundation for resilience-building can be traced back to 2007 with a paradigm shift in disaster risk response through moving away from a system that solely focused on drought and supply of life-saving relief and emergency responses during disasters to a comprehensive resilience-building approach. This approach currently led by NDRMC emphasizes on improving the focus on preventive and proactive aspects of DRM, for example, investing in human and physical infrastructures, enhanced agricultural productivity through improved access to inputs and output markets and both crop and livestock extension services; setting up of a social safety net programme to address the challenges of chronic food-insecure households through shock-responsive policies and promotion of sustainable poverty reduction; piloting weather insurance scheme against drought; and expanding extension services and microfinance institutions, etc. In sum, in addition to the regular humanitarian aid that can save lives, the NDRMC is mandated to coordinate disaster response, risk management, preventive measures and recovery programmes in the country and functions through a well-established structure with clearly defined duties and responsibilities. Section three of this report presents more details in this regard.

1.6. Structure of the report

This report is largely based on review of the secondary data, literature/documents and consultative conversations through guiding questions. It is comprised of eight sections. The first section provides background, objectives and methodology, establishes the conceptual framework and briefly presents DRM in Ethiopia and its contribution towards building resilience to natural and man-made disasters. Section 2 reviews and summarizes various regional initiatives towards establishing effective early warning and early action mechanisms and resilience-building. It also examines the role of these regional initiatives in facilitating cross-border issues, including infrastructure, animal disease, mobility of pastoralists, development and use of common property resources, among which are grazing land and watering points, and mitigating resource scarcity-based conflict and peacebuilding.

Section 3 presents the main sources of disaster risks and the extent of the problem, trends through time in terms of both frequency and intensity. The fourth section discusses the genesis and institutional reform of disaster risk management in Ethiopia from the formal inception of the RRC to the current NDRMC. This is followed by a review and synthesis of major features and elements of policies, strategies and programmes adopted by the Government of Ethiopia to address the challenges associated with protracted and recurrent disasters in Section 5. Empirical evidence based on the analysis of data extracted from LSMS for 2011 and 2018 is presented in Section 6. This section is followed by Section 7, which is about a review of the measures taken by the GoE to mitigate the negative consequences of disasters, save lives and protect livelihoods. The core of this section includes examination of how the GoE and its development partners and humanitarian assistance agencies have moved from classical emergency humanitarian response to disasters to building the resilience of households and communities to better prepare and effectively respond to disaster, leaving no one behind. These include, for example, early warning and response systems, the Productive Safety Net Programme (PSNP), and dryland and pastoral areas development. The section also analyses coordination of interventions, including through decentralized mechanisms and among development partners and accountability mechanisms, facilitated by the Rural Economic Development and Food Security coordination structure.

Finally, in Section 8, the report concludes with possible recommendations for further improving and scaling up similar resilience-building interventions. Best practices drawn from other countries and regions facing similar challenges are identified for consideration.

2. Resilience-building experience in Africa

There is mounting evidence that point out to the fact that economies of African countries are increasingly challenged by the negative impacts of natural hazards and human-induced disasters. Drought, conflict, flooding, desertification and resource degradation are among the most important disaster risks that threaten to undermine the wider economic and development gains made in the last few decades on the continent. The economic, social and environmental impacts posed by these disaster risks are becoming so huge, forcing countries facing similar challenges to join hands to mobilize resources, coordinate cross-boundary actions, and exchange and scale up best practices where and when appropriate. This section reviews the salient features of these regional resilience-building initiatives and attempts to highlight promising actions that may be considered by the GoE and its partners in promoting the effectiveness of their interventions.

2.1. IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRSI)

Following the devastating drought that hit the IGAD region in 2010–2011 and affected an estimated 13 million people, exacerbating the already prevailing food insecurity in the region, the heads of State and government of the region (Horn of Africa and Eastern Africa) convened a summit in Nairobi in September 2011 to discuss the problem of recurrent droughts and collectively agreed to embark on a drought resilience initiative in which they assigned the IGAD Secretariat with the role and mandate to lead and coordinate the implementation of the initiative. That gave birth to IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRSI) with the mandate to focus on the underlying causes of the need for humanitarian aid and approach disaster risk management through long-term and proactive resilience- and development-oriented solutions. Such a paradigm shift was intended to reverse the growing human and social vulnerability against environmental hazards, especially land degradation, desertification, droughts and man-made disturbances, such as resource-based conflicts and economic crises.

The IDDRSI is a holistic and comprehensive initiative aimed at building the resilience of vulnerable communities against the effects of recurrent droughts and achieving simultaneous growth and sustainable development in the IGAD region (IGAD, 2019). Its effectiveness/achievement is evaluated on the basis of a combination of factors, including: (i) adequate, assured and stable food and nutrition security; (ii) reduced vulnerability to disasters, achieved through development actions; (iii) prevention and peaceful resolutions of conflicts; (iv) sustainable livelihood systems; (v) adequate social protection measures for the disadvantaged; (vi) equitable access to sustainably managed natural resources; (vii) active participation and inclusiveness in planning, implementation and decision-making; (viii) assured inclusive economic growth and access to national and natural resources in arid and semi-arid lands (ASALs); and (ix) evolution of strong transboundary movement of people and their livestock, institutions, trade, networks and knowledge economy.

However, priorities may vary based on specific country circumstances. Each Member was to prepare a Country Program Paper (CPP) focusing on intervention areas when developing programmes for the IDDRSI, both at country and regional levels. It must also identify common intervention areas with the view to ease exchange of experiences and discuss challenges and learn from one another. These included environment and natural resource management; access to market and financial services; support to livelihoods and basic social services; disaster risk management for pastoralists; research and knowledge management and technology transfer; conflict prevention, resolution and peacebuilding; and coordination, institutional-strengthening, partnerships and resource mobilization.

At this juncture, it is very important to highlight the extent to which these intervention areas are linked/aligned to absorptive capacity, adaptive capacity and transformative capacity of communities

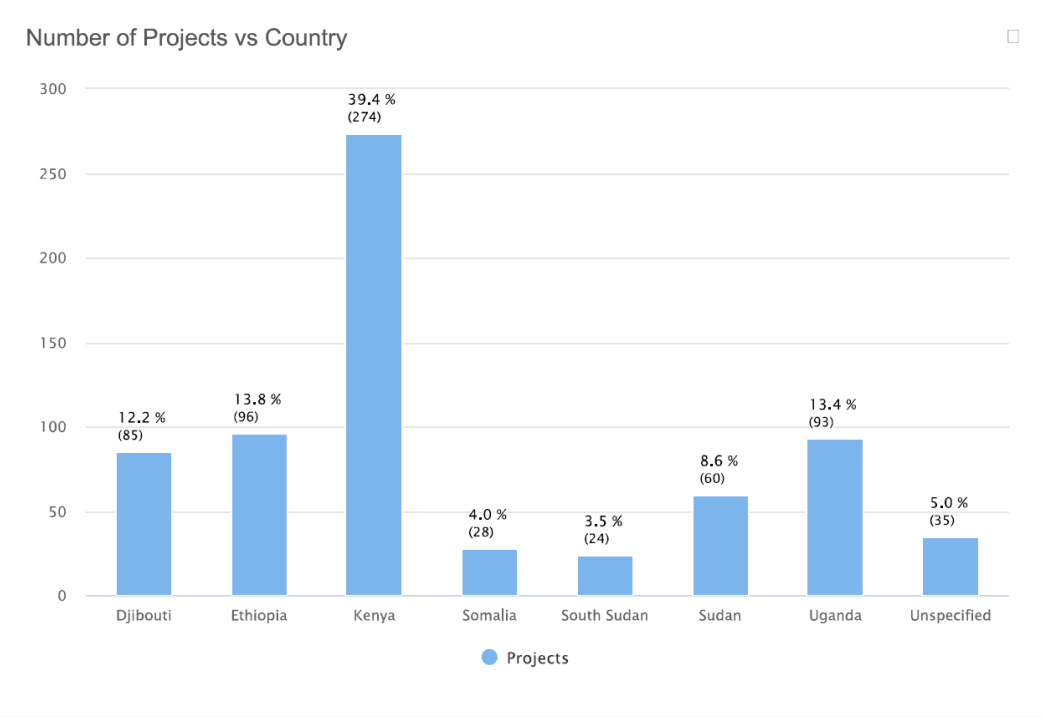
and households discussed in Section 1.3: Conceptual framework for resilience-building.

Since 2011, over USD 16 billion have been committed into the execution of more than 610 projects in different IGAD member countries (Figure 2 to Figure 5) and aimed at enhancing drought disaster management and resilience-building. These projects and programmes have significantly enhanced IGAD's ability to provide a mechanism that harmonizes both regional priorities and development partners' support, especially in circumstances where the member countries have difficulty to attract and/or absorb funding as they grapple with prolonged conflict or require interventions that extend beyond their borders. Some of the flagship investment projects include, to mention a few, Building Opportunities for Resilience in the Horn of Africa (BORESHA), Cross-Border Collaboration Programme in Western Ethiopia and Eastern Sudan (CBCES), the Drought Resilience and Sustainable Livelihoods Program (DRSLP), Strengthening IGAD's Capacity to Enhance Drought Resilience in the Horn of Africa, and IGAD–FAO Partnership Programme (IGAD, 2021b).

The objective of the BORESHA project was to promote economic development and greater resilience, particularly among vulnerable groups in the Mandera Triangle: Ethiopia, Kenya and Somalia. The project adopted a community-driven approach to address the shared nature of the risks and opportunities on in this border area. The CBCES project supported activities to improve income by increasing the value of products, creating job and business opportunities for young people, improving service delivery through provision of basic infrastructure, improving formal and informal peacebuilding structures, and reducing conflict and enhanced effective cross-border trade.

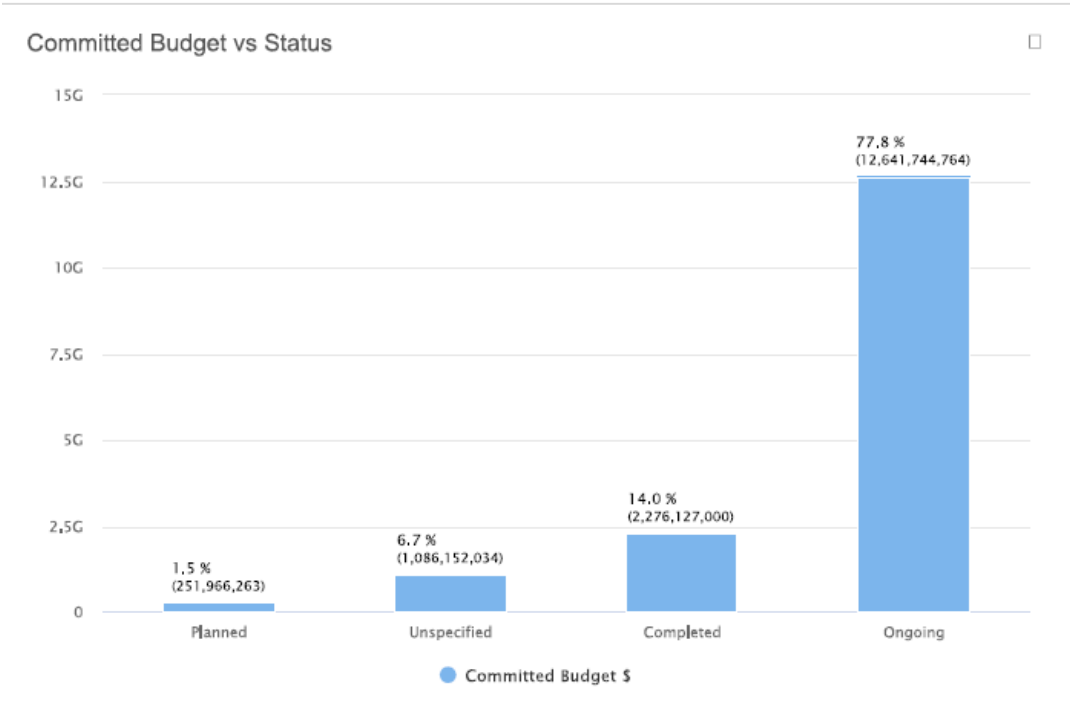
The African Development Bank and IGAD Members, namely, Djibouti, Ethiopia and Kenya together with the IGAD Secretariat developed and implemented the DRSLP to build communities' resilience to drought and climate change shocks, improve their livelihoods and promote regional integration in the Horn of Africa. The programme focused on developing infrastructure for water management and agriculture and livestock production, health and marketing. With the support of GIZ, the project "Strengthening IGAD's Capacity to Enhance Drought Resilience in the Horn of Africa" built the capacity of IGAD and its Member States to develop adequate and proactive policies and interventions to build resilience to drought disaster. The project worked closely with IGAD, its specialized offices, Member States and local authorities throughout the IGAD region in selected intervention areas. Among others, it was to improve internal capacity to deliver services, manage natural resources, strengthen peace and security and build the basic capacity to deal with the drought resilience–migration nexus.

Figure 2: Number of projects by country



Source: IGAD, 2021a. IGAD - 3WMaps. Accessed on 4 May 2021.

Figure 3: Committed budget by status of implementation

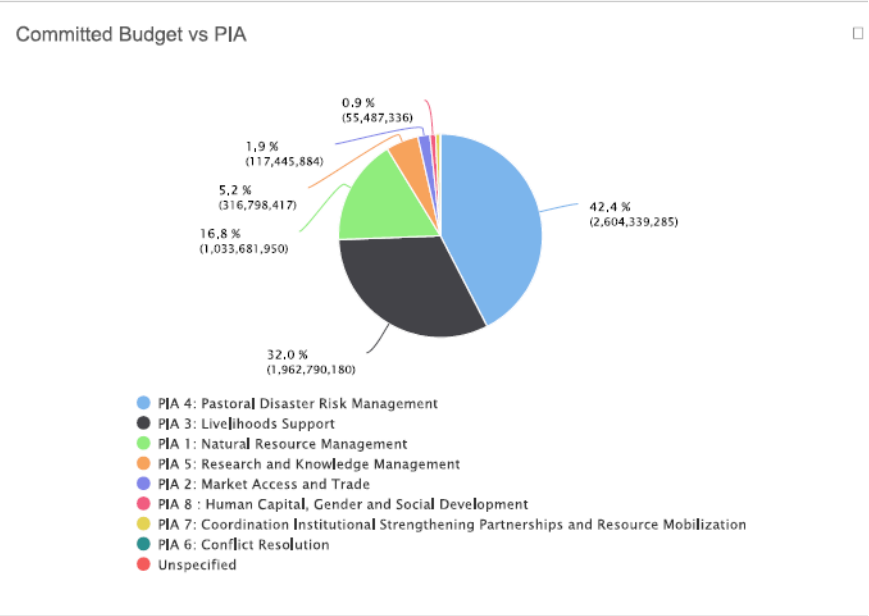


Source: IGAD, 2021a. IGAD - 3WMaps. Accessed on 4 May 2021.

The IGAD–FAO Partnership Programme was designed to bring communities to the centre of the cross-border policy and investment discourse and actions, not only as beneficiaries but also as key stakeholders defining the agenda of their future. The programme has contributed to enhanced resilience of communities in selected cross-border areas and the strengthening of IGAD's capacity to effectively lead and facilitate interaction among its Member States on policy and investments,

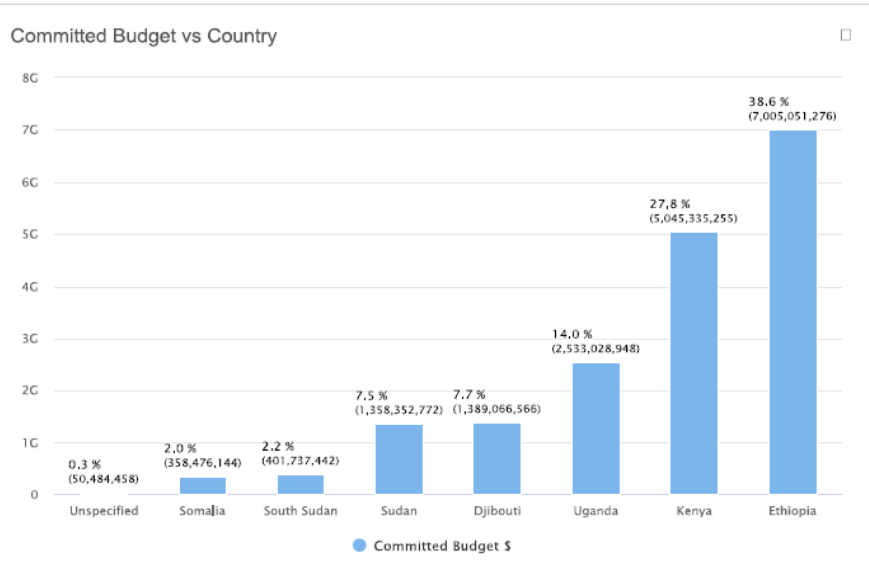
thereby fostering the delivery of cross-border resilience.
Although progress in the implementation of these programmes and projects varies from one IGAD Member to another, all member countries have been active in developing and funding field projects aimed at building resilience. Many of these projects are beginning to show tangible evidence that investing in resilience-building even during the years that are considered to be "normal"[1] has the potential of improving the livelihoods of vulnerable and drought-prone communities. Overall, the IDDRSI strategy has been fundamental in guiding and leading the implementation of regional post-crisis activities, including transition, rehabilitation and development as well as cross-border projects for multisectoral, and holistic interventions on natural resource management, peacebuilding, animal health and trade.

Figure 4: Committed budget by Priority Investment Area (PIA)



Source: IGAD, 2021a. IGAD - 3WMaps. [accessed on 4 May 2021]

Figure 5: Budget committed by country



Source: IGAD, 2021a. IGAD - 3WMaps. Accessed on 4 May 2021.

[1] "Normal" here refers to years when there is no significant disruption in the agrifood systems and livelihoods due to natural hazards and human-induced disasters.

2.2. Global Alliance for Resilience (AGIR) – Sahel and West Africa under CILSS

In response to the catastrophic drought disaster that hit the Sahel region, a number of countries joined efforts to ensure a coordinated response, which resulted in the creation of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS[2]) in September 1973 in Ouagadougou, Burkina Faso, with the mandate to "focus efforts on the quest for food security and combat the effects of drought and desertification for a new ecological balance in the Sahel".

With decades of experience in the implementation of programmes, projects and initiatives in response to protracted drought disasters in an isolated and uncoordinated manner in the region, CILSS and its development partners recognized that a lasting solution to food and nutrition insecurity in the Sahel requires building resilience to climate change, long-term agricultural sector financing and developing trade and regional integration. By making sustained longer-term investments in household resilience, the cost of emergency assistance will be significantly reduced and, ultimately, the cycle of recurring famine will be broken.

The untenable and devastating drought of 2010/11 in the Sahel further strengthened the call for a paradigm shift and paved the foundation for the establishment of the Global Alliance for Resilience (AGIR) – Sahel and West Africa under the leadership of CILSS and the support from its development partners in December 2012, with the objective to eradicate hunger and malnutrition by building resilience among vulnerable populations. AGIR is based on a shared understanding of resilience as "the capacity of vulnerable households, families and systems to face uncertainty and the risk of shocks, to withstand and respond effectively to shocks, as well as to recover and adapt in a sustainable manner." This shared understanding helped CILSS member countries and partners to address, in a unified manner, the acute and chronic causes of food and nutritional crises while helping vulnerable households and communities increase their incomes, access infrastructures and basic social services and build wealth by sustainably strengthening their livelihoods. However, it is important to note that AGIR is not a financial mechanism. Rather, it is a unifying framework to which all actors striving for food and nutrition security in the region may adhere (*Sheahan, 2016)*.

As a unifying framework, AGIR's activities are consolidated around four strategic pillars:

Pillar 1: Restoring and strengthening livelihoods and social protection for the most vulnerable populations
Pillar 2: Strengthening health and nutrition
Pillar 3: Sustainably strengthening food production, incomes of vulnerable households and their access to food
Pillar 4: Strengthening governance in food and nutritional security.

AGIR has deliberately targeted most vulnerable farmers that are poorly connected to markets, who have insecure land tenure and are exposed to climate change-related disaster risks; agropastoralists or pastoralists, whose livestock and fisheries resources are continually threatened by recurring weather hazards; and poor workers faced with job insecurity and at risk of exploitation by criminal and terrorist networks.

Since its commencement, AGIR has promoted a collective and coordinated response from a range of stakeholders across multiple sectors (agriculture, environment, health and education) and cross-border interventions by initiating and implementing more than 103 relevant projects. Some of the

[2] CILSS Member States are Benin, Burkina Faso, Cabo Verde, Chad, Côte d'Ivoire, Gambia, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal and Togo.

notable projects include: support for local economic development and conflict prevention in the Gao and Timbuktu regions in Mali; a programme to strengthen resilience of communities that are vulnerable to food and nutrition insecurity in the northern border areas of Burkina Faso (LRRD); resilience-building for vulnerable communities, households and food- and nutrition-insecure people in Mali; resilience-building for vulnerable urban and rural communities in Mauritania; an integrated project to support the resilience of vulnerable refugees, displaced, returnees and host populations in the Diffa region in Niger; linking relief, rehabilitation and development and promoting the stability and safety of communities in displacement in north-eastern Nigeria; inclusive economic and social recovery for Lake Chad (RESILAC); resilience-building and empowerment of refugees, returnees and internally displaced persons affected by the conflict in northern Mali; and emergency programme for the stabilization of G5 Sahel border areas (PDU).

For the successful implementation of these resilience-building projects and programmes, countries have taken full national ownership of the process in identifying and implementing national resilience priorities that are tailored to national needs. Countries have also built consensus on the root causes of food and nutrition insecurity, the specific populations to be targeted and the expected results, and agreed on concrete, operational arrangements on funding, implementation and collective monitoring and evaluation of the projects at national and local levels. Not only has AGIR facilitated this process but also provided the operational frameworks to support national governments, and has facilitated dialogue between stakeholders to encourage more effective and collective actions on building resilience.

Furthermore, in partnership with its development and technical partners, CILSS has been engaged in the development and implementation of a unifying tool, the *Cadre Harmonisé* (Harmonized Framework), that produces relevant, consensual, rigorous and transparent analyses of current and projected food and nutrition situations since 1999. It is a comprehensive analytical framework that takes into account various indicators of food and nutrition security outcomes and the inference of contributing factors. In addition, it improves the understanding of concepts, enhances the process for estimating vulnerable populations, and strengthens synergy among local agents in different countries and at regional level for more effective food crisis management.

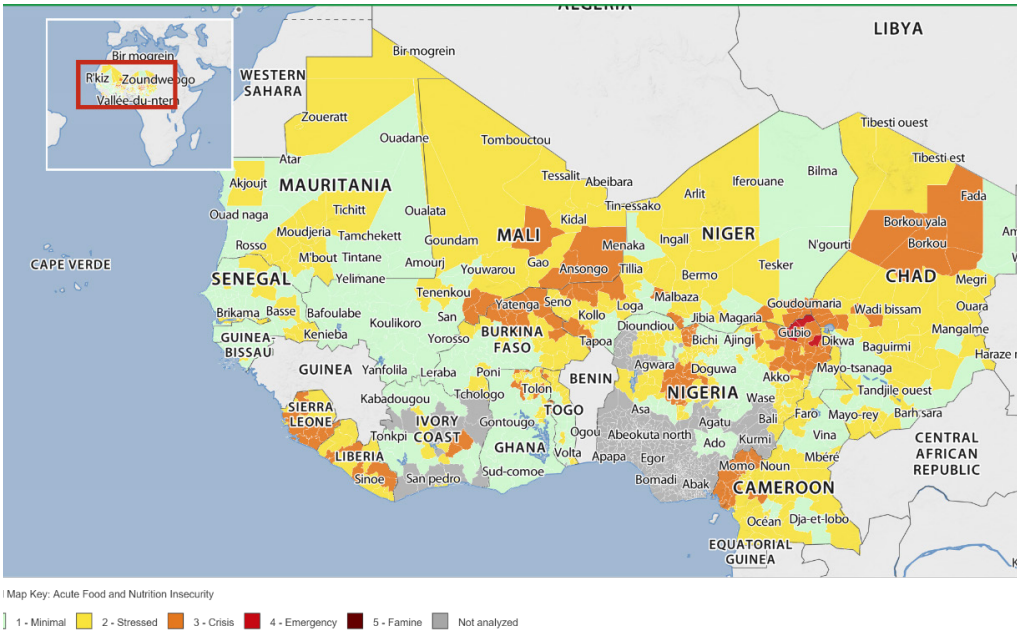
During the last few years, CILSS has coordinated the processes of the *Cadre harmonisé* tool for analysing the vulnerability of populations to food and nutrition insecurity. Drawing on various information sources and a common methodology, the analysis identifies the number and areas of food insecure people. It categorizes the extent of food and nutrition insecurity in five phases: Phase 1: minimal; Phase 2: stressed; Phase 3: crisis; Phase 4: emergency; and Phase 5: famine. Its analysis and interpretation feed into national response plans and informs the decision-making bodies of ECOWAS and UEMOA. It provides the basis for requests by Member States to timely trigger the ECOWAS Regional Food Security Reserve. At the global level, the results of the analysis serve as a basis for the preparation of humanitarian appeals. The analysis is conducted twice a year, offering an assessment of the current situation (October–December and March–May) and the projected situation (June–August). Every year, updated data is presented during the Food Crisis Prevention Network (RPCA) meetings in April and December.

In the Western Africa region, CILSS has been championing the governing on food security and nutrition for more than 30 years through its regional food crisis prevention mechanism on food security (RPCA/PREGEC). These regular consultations are conducted every year by CILSS and its partners and allow for regular dialogue on food security and nutrition in the region between the main actors for decision-making. Early December every year, a shared overview of the situation for food and agriculture in the region and recommendations are produced through the consultative process with the food security actors and the financial partners in the Sahel and Western Africa. This process

has strengthened the early-warning capacity in the countries and enabled early actions, yielding positive results in terms of food crisis prevention and better coordination.

As example, the recently released report by the RPCA reveals that the Sahel and Western Africa are facing a major food and nutrition crisis for the second consecutive year and about 23.6 million people will face various degree of food insecurity crisis during the 2021 lean season (June–August 2021) (Figure 6). The food insecurity situation is worsened by the weakened security situation in northern Nigeria and the G5 region, large flow of internally displaced people (IDP), measures taken to tackle the COVID-19 pandemic, an increase of more than 50 percent in cereal prices compared to the five-year average, and heavy rainfalls in some regions of Burkina Faso, Chad, Niger and Nigeria.

Figure 6: Food and nutrition situation in the Sahel and Western Africa: June–August 2021



Source: Cadre Harmonisé | IPC Global Platform (ipcinfo.org). Accessed on September 26, 2021.

These results raise the alarm to governments and development partners to formulate and implement timely response plans as quickly as possible. These include, for example, continuing to strengthen the scaling up of social protection programmes focused on responding to food requirements, preventing malnutrition and strengthening the resilience of populations in structurally vulnerable areas; taking vigorous measures to ensure the effective security of food and humanitarian assistance operations in hard-to-reach conflict zones; implementing targeted livelihood development and resilience-building programmes for the benefit of populations under food pressure; strengthening the monitoring of food markets in order to better anticipate price increases caused by persistent inflation in certain countries as well as by the high prices of food imports; and implementing multisectoral programmes to restore socio-economic conditions, peacebuilding and to strengthen resilience of vulnerable people (CILSS, 2021).

3. Main triggers of natural hazards and human-induced disasters in Ethiopia

3.1. Overall disaster risk profile

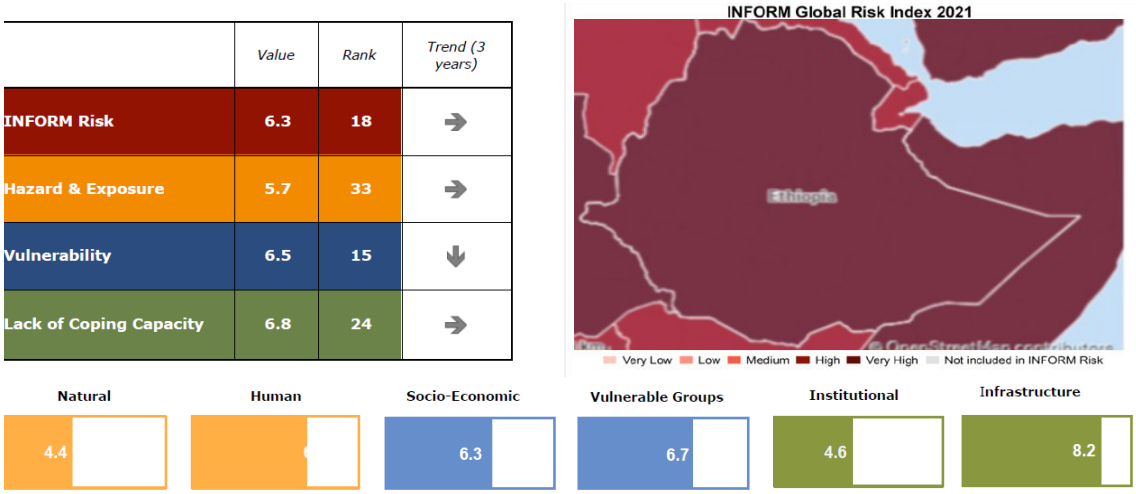
Ethiopia is one of the most disaster-prone countries in Africa with a range of geophysical, climatic, social and economic factors, leading to devastating catastrophes. Although disasters were registered over the last 100 years, their frequency and intensity have increased particularly during the last 50 years. The main triggers of disaster risk in Ethiopia are related to weather and climate (both drought and flooding), aggravated by land degradation and low productivity, migratory insect pests, mainly fall armyworm and desert locust, and conflict.

Smallholder farmers in Ethiopia tend to rely disproportionately on annual crops cultivated on marginal lands, often with insecure land tenure. Land productivity is generally very low, with average yield per hectare of about 1.1 tonnes for teff, 1.3 tonnes for barely, 1.47 tonnes for wheat, 1.75 tonnes for sorghum and 3.4 tonnes for maize (CSA and World Bank, 2020). Persistent land degradation over a period of time and reduction of productivity have frequently resulted in food shortage and spike in food prices. This in turn is associated with a higher vulnerability and lead to an extreme case of hunger. In recent years, infestation by fall armyworm and desert locust swarm have caused massive destruction to both crop production and the grazing land. Internal conflicts, particularly during the last four years, have displaced millions of people, exposing them to vulnerability to food insecurity.

The European Commission Disaster Risk Management Knowledge Centre (DRMKC) integrates information on disaster worldwide and continuously monitors key indicators to support informed decision-making on humanitarian crisis and disaster through INFORM. INFORM Risk Index can be used to scrutinize the main triggers of disaster and the relative position of a country or region at specific period of time. As presented in Figure 7, Ethiopia scores 6.3 (max. 10)[3] and considered to be in the "high risk" category and ranks 18th out of 191 countries evaluated in 2021.

In the Eastern African region, Somalia is the country with the highest risk index and ranks first, whereas Djibouti Kenya, the Sudan, South Sudan, Uganda and rank 40th, 25th, 17th, 2nd and 18th, respectively, and all countries fall under high to very risky category in 2021.

Figure 7: Ethiopia: INFORM Risk Country Profile 2021



Source: DRMKC, 2021. Boundaries and INFORM Index from https://drmkc.jrc.ec.europa.eu/inform-index. Accessed on May 12, 2021. Disclaimer: *Final boundary between the Sudan and South Sudan has not yet been determined. Final status of the Abyei area is not yet determined.*

[3] Thresholds for risk categories: Very low = 0.0–1.9; Low = 2.0–3.4; Medium = 3.5–4.9; High = 5.0–6.4; Very high = 6.5–10.

3.2. Drought and weather-related disasters

3.2.1. The 1972/73 famine: “the unknown famine”

One of the most severe drought-related famines in Ethiopia was recorded in Tigray and Wollo provinces in 1972/73 and was caused by consecutive years of deficient precipitation in 1972 and 1973 leading to compete failure of crop harvest. Although estimates vary, the most cited numbers are that about 2 million people were affected and an estimated 200 000 to 250 000 people died of famine (Dawit, 2015; Graham *et al.,* 2013; Webb and von Braun, 1994). Some case studies suggest that this devastating famine was a result of entitlement failure (Sen, 1981). According to Sen, the famine in Wollo and Tigray in 1972/73 happened despite no shortage of overall food supply in Ethiopia; it was simply because poor peasants did not have sufficient resources to buy food, and that was aggravated by lack of government assistance.

At that moment, there was no early warning and response mechanism in the country. It had taken unjustifiably a long time to study the extent of the problem and come up with relief action recommendations. Even after evidence of the existence of the problem emerged, the government ministries had been preoccupied in a cover up actions, which did not withstand the bands of starving people that arrived at the outskirt of Addis Ababa at the beginning of 1973.

The government officials were adamant and reluctant to accept the severity of the crisis because they were more concerned that such description of the famine was politically embarrassing for the country. However, the severity of the hunger and deprivation of the poor was exposed to the international community by Jonathon Dimbleby with his film depicting the situation on the ground and reported by the BBC news as “the unknown famine”. This, of course, helped to instigate a heightened protest against the government, which culminated in its overthrow in September 1974 and replacement by the military government. Even the establishment of the Relief and Rehabilitation Commission (RRC) to respond to the famine did not salvage the Haile Selassie regime that ruled the country for over 40 years.

3.2.2. The 1984/85 famine: drought, war and policy failure

Although attempts were made over a decade following the 1972/73 famine to improve the early warning and response system, Ethiopia was further annihilated by the drought and famine of 1984/85. This was triggered by an exceptionally large deficit of rainfall in the northern part of the country, mainly the Tigray region, but exacerbated by the war with Eritrean and Tigrayan insurgents, who were operating in many of the affected regions. The situation was further aggravated by unpopular government policies regarding land reform and investment, market failures and political considerations.

At the peak of the famine, it was estimated that about one million died from starvation, about 400 000 refugees left the country, and 2.5 million people were internally displaced and left destitute, without resources to rebuild their lives, according to the United Nations.

Ethiopia was back in international headlines with another apocalyptic-scale famine and television screens worldwide began to be filled with images of starving masses from northern Ethiopia. Although response from international community was slow at the beginning due to ideological differences between the Western and Ethiopian governments, arrival of massive aid had rescued millions of lives. But the bureaucratic hurdles, inefficiency and poor infrastructure posed another challenge during the arrival and distribution of the emergency humanitarian assistance.

From the 1984/85 drought and famine, the Derg regime built on previous lessons and adopted a number of different policy and programme approaches, including improving the early warning system and the logistics of moving food and non-food supplies, and resettling peasants from the drought-prone areas of northern and central Ethiopia to the relatively fertile provinces of the west and southwest. Although there was some progress in improving the early warning and response mechanism, the efforts were overwhelmed by other factors, including the war in the northern part of the country which, at times, consumed more than 40 percent of the national budget, and shortage of human labour in the agricultural sector as most of the rural youth had to join the compulsory military service.

3.2.3. The 2010/11 drought: Ethiopia avoided famine: a step towards resilience

One of the most severe droughts of the 20th century occurred in Eastern Africa in 2010/11 when crop and livestock production were disrupted in Ethiopia, Kenya and Somalia, mainly triggered by unusually strong El Niño.[4] Seasonal rains failed for two consecutive seasons in Ethiopia and Kenya, and for previous two years in Somalia, exposing an estimated 13 million people to food shortage in the region. Subsequently, UN declared famine in different regions of Somalia.

In Ethiopia, even though millions of people were affected by the severe drought and unable to produce their own food, the condition did not escalate to famine. After the famine in the 1980s, steps were taken by the Ethiopian government to protect its people should conditions once again worsen. It seems that such investment in building resilience to drought have started to bear fruits. The Early Warning and Response System had predicted the drought as early as August 2010, alerting in advance the GoE of the coming crisis. The significant investment in disaster response infrastructure including warehouses, food distribution centres and transport facilities paid off and avoided any loss of life due to famine.

Furthermore, Ethiopia experienced very good harvest during 1990s through 2009 due to relatively good rainfall seasons, investment in agricultural research and extension, increased use of fertilizer and high yielding varieties, and political stability. These factors contributed to boosting agricultural productivity and production for a number of consecutive years, enabling, Ethiopia to successfully avert famine, despite the intensity of the 2010/11 drought.

3.2.4. The 2015/16 Drought: from saving lives to protecting livelihoods

The 2015/16 drought is considered to have been the most severe drought in Ethiopia in the last 50 years. It was triggered by El Niño weather phenomenon that brought with it severe drought in Southern and Eastern Africa and the Sahel region, exposing an estimated 60 million people to food shortage. As a result of the impact of the 2015/16 drought, crop productions as well as grazing resources in northern, eastern and southern areas of Ethiopia had sharply deteriorated, with the estimated number of food insecure people increasing to 10.2 million (NDRMC, 2016). The total cost of providing humanitarian assistance was estimated to be USD 1.4 billion. The Government of Ethiopia was also successful in mobilizing internal resources to kick-start the initial response and protect development gains while waiting for additional funding from partners. Indeed, the Government of Ethiopia allocated over USD 500 million in emergency support in 2015/16 and a further USD 97 million in support of agriculture sector interventions in early 2016 (USAID, 2016). This was made possible due to expanded fiscal space resulting from almost two decades of continuous economic growth, political will and prioritization.

[4] El Niño is a weather phenomenon that is associated with a band of warm ocean water that develops in the central and east-central equatorial Pacific, including the area off the Pacific coast of South America and may disrupt typical regional and global weather patterns.

Despite severe drought-related production shortfalls, Ethiopia did not suffer from a major famine-related death in 2015/16, in contrast to the more than 200 000 reported deaths from only 3 million people affected by the 1972/73 drought. The early warning and response system was better prepared as the concept of building resilience to both natural and human-induced disasters was embedded into the processes of government response to disasters. The policy and institutional reforms earlier described in Sections 3 and 4 played a significant role in averting famines or major food security crises in recent years. Targeted and efficient emergency operations, existence of Productive Safety Net Programme (PSNP), effective coordination across government agencies with relative openness in information-sharing with development partners, and emergency food reserves have been central to effectively managing disasters in 2015/16. Therefore, the relief activities not only provided humanitarian assistance but also played a critical role in protecting assets of the drought-affected people. For instance, livestock destocking interventions, development of watering points and provision of livestock feed greatly helped households to avoid a desperate sale of their assets and enabled them to attain a relatively quick recovery.

4. Genesis and institutionalization of DRM system in Ethiopia

4.1. From Relief and Rehabilitation Commission to National Disaster Risk Management Commission

Ethiopia has long been concerned about the huge impacts that natural and human-induced disasters have on its population. Their impact is particularly severe given the large proportion of the Ethiopian population who predominantly make their livelihoods from rainfed agriculture. So, as climate changes and the natural resources become more degraded, the suffering of the population has worsened over time. Therefore, concerted efforts have been made by successive governments to establish an organizational setup to strengthen its operations in the last 50 years.

The pioneering organization in this regard was the establishment of the Relief and Rehabilitation Commission (RRC) in 1974[5] just six months before the downfall of Emperor Haile Selassie. It is widely reported that the Haile Selassie's government which relied on an untrustworthy bureaucracy suppressed news of the desperate conditions and famine that ravaged households in Wollo and Tigray provinces. But opponents of the government, led by the Provisional Military Administrative Council (Derg) exploited the opportunity to agitate for reform, and the crisis became a powerful agent of political change, ultimately dethroning Haile Selassie and putting an end to his regime.

The RRC eventually grew to be arguably the largest and most powerful part of the Ethiopian Government during the 1970s and 1980s, except the military (Rashid, Alemu and Dorosh, 2019). By 1985, the organization was the largest relief institution of its kind in Africa, with over 17 000 field workers, a fleet of trucks and offices and warehouses throughout the country. Although some in the government felt that the RRC was institutionalising a humiliating and permanent dependency on foreign aid, it managed to distribute a massive amount of relief assistance.

The measures taken by the Derg to reduce rural vulnerability did not prevent another famine in 1984/85. Drought conditions were exacerbated by intensified conflict with opposition groups such as the Tigrayan People's Liberation Front (TPLF), the Eritrean People's Liberation Front (EPLF) and the Oromo Liberation Front (OLF). At the same time, Ethiopia has witnessed the influx of INGOs, and more donors preferred to rely on them to channel their resources. Some INGO directors became self-appointed country experts on well publicized tours of famine areas and were providing briefings to ambassadors, celebrities and journalists, and even sometimes were blamed for portraying Ethiopia and the government unfairly (Lautze, Raven-Roberts and Erkineh, 2009).

The RRC eventually became overly political, and also failed to sufficiently raise the alarm about the next big famine in Ethiopia, the 1984/85 famine, even though it remained a favourite of the government. Subsequently, there was an increasing recognition of the need to establish a permanent early warning system (EWS) that would be responsible to continuously collect information and analyse drought and other disaster risks. In 1995, the RRC was restructured and named Disaster Prevention and Preparedness Commission (DPPC) with significant changes in mandate to strengthen the linkages between relief and early warning and response under Proclamation No 10/1995. The objectives of DPPC were to: (i) prevent disasters by tackling their root causes (i.e. prevention); (ii) build, in advance, the capacity necessary to reduce the impact of disasters (i.e. preparedness); and (iii) ensure the timely arrival of necessary assistance to victims of disasters (i.e. emergency response).). The EWS was essential for informed decision-making provided to the DPPC and other emergency response community agencies with sufficient lead time to take effective preparatory measures and to quickly decide and coordinate the course of action during the response phase.

[5] Even though the RRC had been operational since 1974, the proclamation to establish RRC was adopted by the Provisional Military Administrative Council of Ethiopia in 1979 (Proclamation No. 173 of 1979).

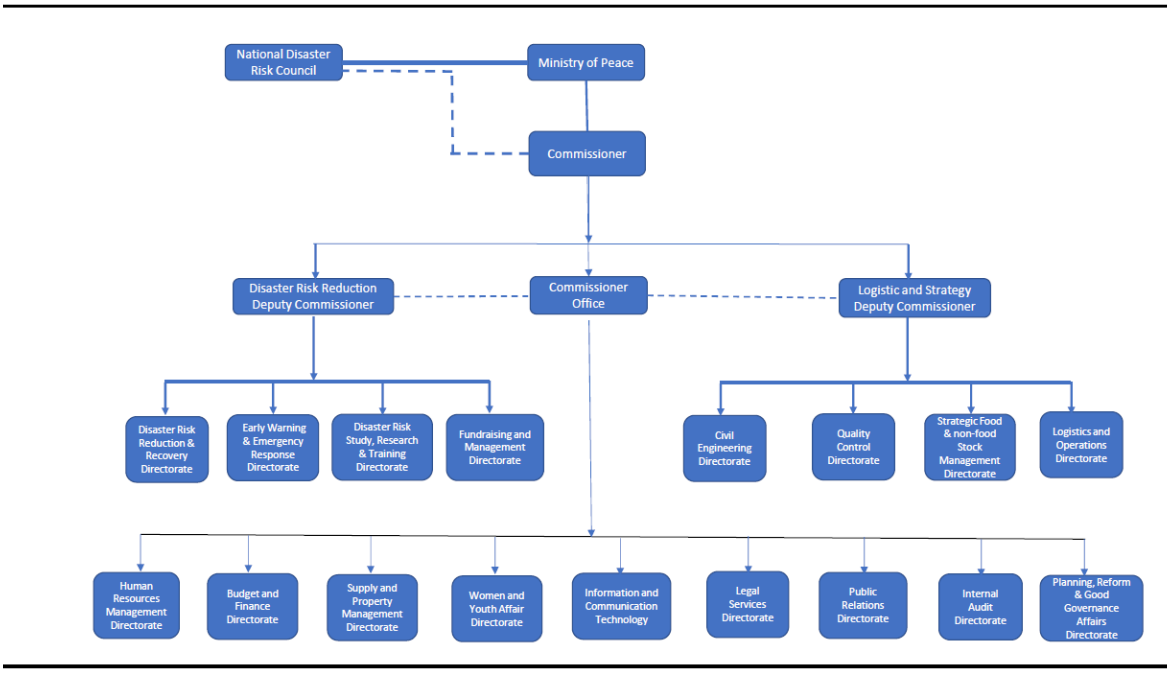
DPPC was renamed again as the Disaster Prevention and Preparedness Agency (DPPA) in 2004 without significant change in the mandate to focus on emergency response. But as a result of the Business Process Re-engineering (BPR), DPPA was transformed into Disaster Risk Management and Food Security Sector (DRMFSS) in 2007 and transferred to the Ministry of Agriculture and Rural Development to coordinate disaster risk management and food security under one sector. This institutional arrangement was supposed to contribute towards reducing disaster risks and potential consequences of disasters by providing appropriate and timely responses to disasters before, during, and after the disaster period at all levels through establishing a coordinated, accountable, and decentralized system.

Furthermore, the new multisectoral and multihazard DRM approach to disaster risk management is based on vulnerability profiles, thus enabling it to target potential and impending disasters through a comprehensive response. Its aim is to articulate the underlying and associated causes and implications of disaster vulnerability in an attempt to help policymakers, planners, practitioners and communities to design appropriate, targeted risk reduction and awareness, disaster management and development of programmes. In order to address the human capacity gap for research and innovation, Bahir Dar University established a new Department of Disaster Risk Management and Sustainable Development in the Faculty of Agriculture and Environmental Sciences, developed a curriculum on DRM, and started undergraduate and graduate programmes as early as 2005.

The DRM in Ethiopia has been further strengthened by the establishment of the National Disaster Risk Management Commission (NDRMC) in 2015. The establishment of NDRMC has been believed to have significantly strengthened the legal and operational frameworks for a comprehensive and integrated National DRM system at national and local levels. The Commission was mandated to ensure a more streamlined DRM approach, including an early warning and response system across all government sectors, at the federal, regional, *woreda* and *kebele* levels as well as in the city administrations. In addition to the regular post-crisis recovery and response functions of DRM, the entire process remained in line with its National Policy and Strategy on Disaster Risk Management adopted in 2013. The NDRMC is responsible for coordinating disaster response, risk management, preventive measures and recovery programmes in the country and functions through a well-established organizational structure (Figure 8) with clearly defined duties and responsibilities. Furthermore, together with partners, NDRMC coordinates a transport fleet, warehouses and office facilities located in strategic areas of the country, manages the Emergency Food Security Reserve Administration (EFSRA) and the National Disaster Prevention and Preparedness Fund (NDPPF).

Furthermore, the Ministry of Agriculture took a step further to strengthen the Disaster Risk Management–Agricultural Task Force (DRM-ATF) which plays vital role in ensuring that not only DRM policies and strategies give due consideration to mainstreaming agriculture, but also agricultural development policies and strategies integrate DRM in the process. DRM-ATF also liaises with a range of relevant stakeholders, which is critical for timely, coherent and effective interventions by mobilizing stakeholders to respond in a coordinated and strategic manner. The DRM-ATF is technically supported by Special Advisory Group (SAG) set up in response to specific occurrences of events such as infestation of fall armyworm and desert locust.

Figure 8. Organizational structure of the NDRMC



Source: https://edrmc.gov.et, Accessed on May 14, 2021.

There is further recognition that in addition to high level of vulnerability to recurrent and protracted drought, millions of households were internally displaced due to conflicts triggered by ethnic-based conflicts. These internally displaced people tend to live in insecure areas with little or no access to basic services and/or humanitarian assistance. Despite attempts to address the root causes of displacement of people in the recent years, old conflicts are still more entrenched and new conflicts escalated along various regional state borders and Tigray region. This development prompted the Government of Ethiopia to move the NDRMC from the MoA to the Ministry of Peace (MoP). This structural shift recognizes the need for aligning emergency humanitarian assistance to peacebuilding. That implies that building resilience to multihazard risk is not possible without enduring peace or embracing the humanitarian–development–peace nexus. This approach is expected to help NDRMC to take into account both the immediate and long-term needs of affected populations and enhances opportunities for peace.

4.2. Local-level institutions for disaster response – *wereda*/district DRR planning

During the last 50 years of experience in disaster risk management, Ethiopia has not only built a relatively strong institutional architecture for DRM but there has also been an attempt to decentralize the relevant roles and responsibilities to local level: regional, district/*wereda* and *kebele*. Most DRM functions require local-level planning and implementation actions. Decentralization strengthens capacity of households, communities and local authorities to manage and adapt to disasters and other risks more effectively, thus reducing their vulnerability, humanitarian and economic impact, as well as irregular migration and forced displacement.

The Ethiopian Government has put in place the key building blocks to support decentralization of DRM, notably through mainstreaming the DRM policy and strategy into flagship programmes and development and adoption of *Wereda* Disaster Risk Mitigation/Adaptation Planning Guidelines (DRMFSS, 2013). Furthermore, the 2013 National Policy and Strategy on Disaster Risk Management of Ethiopia not only guides the shift from an emergency approach into a development approach but also mandates that DRM should be decentralized and community-based with a

participatory approach.

The decentralized approach to DRM in Ethiopia is based on a *Wereda* Disaster Risk Profile (WDRP), which establishes an extensive database at community/*kebele* level and provides all necessary information on disaster risk elements. This information system forms the basis for designing DRM strategies at local level. Once the *weredas* and communities have established their profiles and identified the disaster risk elements, the next step is to build a comprehensive programme which forms the full cycle of DRM, consisting of prevention, mitigation, preparedness, response, recovery and rehabilitation.

The *Wereda* Disaster Risk Profile involves data collection to produce profiles for most of the *weredas* and communities. More specifically, it includes:

- analysis of the underlying causes of disaster risk, which can provide the basis for accurate context-specific disaster risk reduction/adaptation plans;
- data that informs the early warning and response systems;
- information used as basis for elaboration of comprehensive contingency plans at district level;
- information to serve as baselines for project planning and implementation (by government, NGOs and other development partners, and the private sector);
- basis for standardizing risk assessment at national level.

The methodology of *Wereda* Disaster Profile has been endorsed by the National Statistics Agency, supports informed decision-making, and is regarded as best practice in Africa.

Accordingly, the information contains crucial local indicators of disaster-related risks, vulnerability and capacities. It also documents the exposure, sensitivity and resilience of a population, place and system to such risks. Such an approach has also shown its effectiveness in increasing efforts to build resilience with support from development partners. The European Union, for example, has committed their support through various projects and programmes.

For instance, the European Union Resilience-Building Programme in Ethiopia (RESET) is an innovative initiative that is based on the premise that chronic humanitarian and longer-term needs and recurrent food insecurity, mainly caused by natural and human-induced disasters can be more efficiently addressed via a longer-term resilience approach, linking humanitarian and development actions at local level, rather than through short-term reactive emergency humanitarian response actions and fragmented development activities (European Union, 2014). Thus, decentralization of the disaster risk management activities has shifted most of the activities to local level through the delegation of authority and resources, and improved the resilience capacity of the system, communities and households.

5. Salient feature of policies and strategies on DRM in Ethiopia

Natural hazards and human-induced disasters have caused and continue to cause significant loss of life and livelihood damage in Ethiopia. In most African countries, there is growing evidence that the impacts of drought-related disasters, largely triggered by climate change, have worsened through time due to poor disaster risk management policies and governance practices that lack sustainable outcomes and infrastructure. As a result, government institutions, communities and households find themselves struggling in the response and recovery phases to provide both financial and physical resources in the aftermath of disasters. Things seem to have developed in a different direction in Ethiopia as the country has recognized, even in 1980s, that attainment of sustainable development and resilience requires putting in place policies and strategies that enhance the capacity of the government and other stakeholders to predict, prevent, prepare and respond effectively to natural and human-induced disasters. Accordingly, the Government of Ethiopia adopted the National Disaster Prevention and Preparedness Strategy (NDPPS) in November 1989 and updated it periodically based on a better understanding of the circumstances and lessons learned over time with regards to response measures and approaches. Furthermore, mainstreaming DRM in agriculture, food security and other pro-poor sectors has remained at the centre stage of policy dialogue in Ethiopia as it declared openly poverty and food insecurity as the number one threat to national security and socio-economic stability since 1990s.

5.1. The National Disaster Prevention and Preparedness Strategy (NDPPS) of 1989

The NDPPS is based on the proposition that famine is a human tragedy, precipitated by a confluence of natural forces and human activities that ultimately can be overcome by human will and action. The main stated objective of the strategy is to eliminate the vulnerabilities that lie at the root cause of famine. It notes that this is accomplished by ensuring through appropriate means of preparedness that the lives of famine-threatened people are protected, both by enhancing government's ability to respond and by developing an effective system of community self-help. The Strategy proposes disaster mitigation, relief preparedness, disaster prevention in the long run and coherence with overall development goal of the nation as its building blocks (PDRE, 1989).

A range of measures that can mitigate those factors that plunge vulnerable people into the abyss of famine were also suggested. These include, to mention a few, enacting appropriate legislation, establishing an appropriate institutional structure, enhancing the information system for early warning, and developing the link between NDPPS and the National Conservation Strategy to ensure that conservation and natural resources management contribute to disaster prevention and ensure environmentally sustainable development.

5.2. The National Policy on Disaster Prevention and Management (NPDPM) of 1993

In October 1993, the Transitional Government of Ethiopia formulated and adopted the National Policy on Disaster Prevention and Management (NPDPM), setting up the framework that ensures relief assistance is provided to the affected populations while ensuring contributions to disaster prevention and sustainable development. Accordingly, disaster prevention got due attention in the government's development efforts. The Policy clearly recognizes a congruence of relief efforts and planned development to strengthen the economic fabric of the disaster-prone areas to mitigate the suffering of the affected population and enhance their capability to face the challenges of such disasters in the future, and so created the basis for building resilience in the long term.

The NPDPM established the National Disaster Prevention and Preparedness Committee (NDPPC), chaired by the Prime Minister and with a membership of Ministry of Agriculture, Ministry of Finance, Ministry of Health, Ministry of Defence, Ministry of Planning and Economic Cooperation, as an apex body to oversee the rendering of relief to disaster-affected population. The same structure was also proposed at regional and local levels, paving the way for decentralization of DRM. Furthermore, the NPDPM facilitated the establishment of the Emergency Food Security Reserve Administration, the National Disaster Prevention and Preparedness Fund (NDPPF), the National Early Warning Committee, and the Crisis Management Group at national level. The NDPPF was proposed to provide resources for the implementation of relief measures. This also laid the foundation for mainstreaming the DRM into the national and sectoral planning and budgeting system.

5.3. The National Policy and Strategy on Disaster Risk Management (NPSDRM) of 2013

After years of experience in disaster risk management, the Republic of Ethiopia further recognized that DRM not only encompasses a full continuum from preparedness, relief and rehabilitation, mitigation and prevention, but also reducing the effects of disaster and can only be possible through building resilience to withstand impacts of hazards and related disasters. Thus, a more elaborate and comprehensive National Policy and Strategy on Disaster Risk Management (NPSDRM) was enacted in July 2013.

The NPSDRM provides the overall framework for reducing disaster risks and potential damages and losses caused by a disaster through a comprehensive and coordinated disaster risk management system in the context of sustainable development. Its stated vision is to ensure that the capacity for withstanding the impacts of hazards and related disasters is built at national, local, community, household and individual levels; and that damages and losses caused by disasters are significantly reduced by 2023.

The policy includes a series of directives and strategies, formulated to reduce and eventually prevent disaster risk and vulnerability, build resilience to withstand impacts of hazards and related disasters, and, through the provision of appropriate and timely response, minimize potential losses from disasters by establishing a comprehensive and coordinated disaster risk management system that is in line with the Constitution of the Federal Democratic Republic of Ethiopia and its development policies and strategies.

Accordingly, the policy identifies ten directives and related strategies, which include the comprehensive disaster risk management system; early warning system; official disaster declaration system; resource mobilization; information and communication, among others. It recommends the creation of a Disaster Risk Management Council to lead the implementation of the policy, and a Disaster Risk Management Coordination unit to support this task by coordinating different stakeholders.

The NPSDRM recognizes the critical role of agriculture in resilience-building. It states that the capacity of the country to withstand and mitigate the impacts of natural hazards and human-induced disasters through provision of timely response has been enhanced by the level of accelerated and sustained economic growth led by the agricultural sector. Furthermore, most of the natural disaster risks identified in the policy document such as drought, flood, livestock disease outbreak and crop pest infestation are linked to the core activities of the MoA. Therefore, the latter was tasked to act as a lead institution with respect to agriculture-related hazards and associated disasters.

5.4. National and sectoral policies and strategies

In parallel, there are a number of comprehensive and sectoral policies and strategies adopted by the GoE that have a direct implication on effective DRM and resilience-building. The Climate-Resilient Green Economy (CRGE) was initiated in 2011 by the GoE to protect the country from the adverse effects of climate change and to build a resilient and green economy that will help realize its ambition of reaching middle-income status before 2025. The CRGE is a strategic framework that provides an opportunity to integrate short-, medium- and long-term disaster risk management, building greater coherence for climate change adaptation and resilience in the agrifood system. A national CRGE facility is in place, which employs a Multi-Partner Trust Fund modality aimed at mobilizing resources and coordinate efforts to improve the environmental management for a climate-resilient green development. The facility provides grants, loans or ex-post rewards for capacity-building, implementation of sectoral CRGE investment plans, priority initiatives, technology-generation and/or transfer, and a combination thereof.

In order to improve the food security situation of the country, successive national food security strategies have been designed in 1996, 2002 and 2003/04. The aim of these policies and strategies was to improve the food security of a large segment of the vulnerable population, estimated to be 15 million people in years of extreme drought-related and/or other hazards. These policies rest on major components and include, as summarized by Enyew (2010), improving rural households' productivity and production; developing the contribution of the livestock sector in food security; expanding and strengthening irrigation schemes; implementing sustainable land-use practices; building up human and institutional capacity; improving the provision of clean drinking water; expanding rural credit services and rural market services; expanding and strengthening off-farm employment opportunities; and implementing resettlement programme.

In particular, the Ethiopia's Agricultural Sector Policy and Investment Framework (PIF 2010–2020) embodies the concepts of producing more, selling more, nurturing the environment, eliminating hunger and protecting the vulnerable against shocks. DRM constitutes an important and integral part of one of the four thematic areas: Disaster Risk Management and Food Security (DRMFS) with a strategic objective to achieve universal food security and protect vulnerable households from natural disasters. Even though marking distinctly between DRM and food security or the PSNP investment is very hard, if not impossible, observers claim that DRM was overallocated resources of PIF (Chipeta *et al.,* 2015). However, there is also productive component of investment in DRM that aims at promoting the resilience of people who are vulnerable to disasters.

Furthermore, the National Social Protection Policy of Ethiopia (2012), the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), the Growth and Transformation Plan (GTP), and the Pastoral Development Policy and Strategy (2021) also address the importance of reducing vulnerability to disaster risks as a necessary condition to spur economic and structural transformation and sustain accelerated growth towards the realization of the national vision to become a low middle-income country by 2025.

5.5. Disaster Risk Management Strategic Programme and Investment Framework (DRM-SPIF) of 2014

Ethiopia has also developed and started the implementation of the Disaster Risk Management Strategic Programme and Investment Framework (DRM-SPIF) in 2014. The DRM-SPIF provides a strategic framework for the prioritization and planning of investments that will drive Ethiopia's Disaster Risk Management system. It is designed to operationalize the DRM policy by identifying

priority investment areas with estimates of the financing needs to be provided by the government and its development partners. The DRM-SPIF is a strategic framework that outlines major areas of investment that can then be more fully fleshed out with development partners moving forward. In this way, the greatest buy-in and sense of ownership will be created while clearly following strong government leadership and direction.

The DRM-SPIF focuses on the creation of a comprehensive system for managing disaster risk that builds on past lessons and works to increase cross-sectoral multiagency integration. DRM-SPIF also gives appropriate emphasis to various components, including the importance of food reserves and distribution. It is committed to increasing the resilience of those vulnerable to disaster by mainstreaming DRM into all relevant sectors, including agriculture, to building capacity of the Ethiopian Strategic Food Reserve (ESFR), and to enhance the emergency response capability of the country.

5.6. International conventions and instruments

Ethiopia has also ratified international conventions and instruments, including the Hyogo Framework for Action (HFA) for disaster risk reduction (predecessor of SFDRR), the Sendai Framework for Disaster Risk Reduction (SFDRR), the Paris Agreement on Climate Change, and the 2030 Agenda for Sustainable Development with its Sustainable Development Goals (SDGs), and developed and implemented the necessary plan of actions to implement them and realize the respective targets. These international conventions and instruments also mark a decisive departure from a sole focus on risks associated with drought to a multihazard and multisectoral approach to building the resilience of households and communities to natural and human-induced disasters. Thus, it seems that there is a growing consensus that building disaster resilience is everyone’s business and is a shared responsibility among citizens, the private sector, and the government.

6. Empirical evidence on change in household resilience

6.1. Introduction

Resilience capacity measures the ability of the household to reduce its exposure to shocks through preventive, adaptive and transformative coping strategies. Therefore, resilience capacity requires that proactive and informed choices about alternative livelihood schemes are made in order to build a favourable environment for systemic change to recover to a previous state of well-being (FAO, 2021). Resilience, in the case of Ethiopia, is shown to be closely linked to poverty. Any change in resilience capacity affects multidimensional poverty, consequently enhancing future capacity to react to shocks (Haile *et al.,* 2021).

In this section we provide quantitative evidence to changes that occurred in household resilience in Ethiopia. We approximate household resilience using the resilience capacity index (RCI). The RCI is a statistic that summarizes a household's status on factors hypothesized to influence its ability to bounce back from an unknown stress. In accordance with the policies and programmes implemented over the last decade (and described in the previous sections), a household's preparedness to face disasters and adverse shocks may have changed.

Our objective is threefold:

- First, we assess the change in household resilience at national level and disaggregate across gender and regions, rural versus urban. This descriptive investigation aims to characterize households where resilience has increased or decreased strikingly between the base (2011) and reference (2019) years.
- Second, we determine the variation that occurred in the resilience pillars and the resilience structure matrix in between the two periods and across regions.
- Third we aim to uncover the effects on household resilience of shocks such as drought, flood, animal death, illness and commodity price spike, amongst others.

The descriptive and inferential analysis revealed a 9 percent increment in the resilience capacity index (RCI) driven by social safety nets (SSN) and adaptive capacity (AC). While assets and access to basic services (ABS) have improved from their 2011 level, they remained only marginally significant in the resilience matrix structure of 2018. This investigation provides evidence that the most-resilient and least-resilient groups witnessed the most significant resilience improvement between the base and reference years. While urban households were more resilient than their rural counterparts, female-headed households were found to be more resilient than male-headed ones. Also, we found average households from urban regions like Addis Ababa, Harar and Dire Dawa to be more resilient. Lastly, this quantitative investigation revealed that shocks such as drought, flood, heavy rains, crop damage, price fall of commodities and farm inputs, and livestock death are significantly associated with household resilience.

The remainder of this section is organized as follows:
Subsection 2 presents methods and data, while Section 3 describes and discusses results, including the determinants of household resilience to food insecurity in Ethiopia and the impact of shocks on resilience. Finally, Subsection 4 concludes our work and provides policy recommendations.

6.2. Methods and data

In this subsection we first present the approach used to estimate resilience and we then describe the methodology used to test for resilience change. We approximate resilience using the resilience

capacity index (RCI) estimated using the resilience index measurement and analysis (RIMA-II). The RCI approximates household resilience to food insecurity based on four pillars, namely access to basic services (ABS), assets (AST), social safety nets (SSN) and adaptative capacity (AC).

As presented in the general introduction of this report, household resilience capacity is determined by its absorptive, adaptative and transformative capacities. These three factors generate the pillars used in RIMA analysis. Specifically, absorptive capacities are captured through the assets pillar; adaptive capacities holds the equivalent pillar name; and finally, transformative capacities are approximated by the two pillars of access to basic services and social safety nets (FAO, 2016).

To identify the most relevant aspects of household resilience capacity change between 2011 and 2018 in Ethiopia, we first employed descriptive statistics and looked at the structure of resilience at a point in time. In other words, we assessed which components (pillars and variables) emerged as the most important elements of resilience (static perspective). Next, we used a regression analysis on data-sets organized as pseudo-panel to investigate the key drivers of resilience change between the base (2011) and reference (2018) years.

6.2.1. Measuring resilience using the resilience index measurement and analysis (RIMA) approach

We estimated resilience index and its determinants using a two-stage procedure. First, we used factor analysis (FA) to identify the attributes, or "pillars," that contribute to household resilience, starting with observed variables.

The of a household, at time , is a function of the households' capacity to absorb, adapt and transform stress, and constitutes:

Access to Basic Services (ABS): Exogenous responses provided by the public play a key role in determining the risk exposure of households. Access to electricity, clean water, improved toilets, schools, markets and health facilities represent ABS.

Assets (AST): Assets are part of household wealth which consistently predict future poverty status as compared to consumption. Better possession of productive assets, such as land, livestock and agricultural tools and inputs, enable households to produce consumable or tradable goods. Non-productive assets, such as house, vehicle and household amenities reflect living standards and wealth of a household.

Adaptive Capacity (AC): Variables used as a household's capacity to cope with and adapt to shocks include food ratio, number of income sources, diversification of food production and education level.

Social Safety Networks (SSN): They comprise the ability of households to access help from relatives and friends, from government, from international agencies, charities, and NGOs. The variables include formal and informal access to cash or in-kind transfers to households from different sources, participation in productive safety net programs (PSNP) and remittances.

Food security (FS): Better access to food directly correlates with building the resilience capacity of households. Indicators include the household dietary diversification score (HDDS), the food consumption score (FCS), as well as the share of food expenditure in the total household expenditure.

To answer research questions, we use both descriptive and inferential analysis.

First, we reported simple student T-tests and graphs on the change in household resilience between 2011 and 2018, using resilience structure matrices to understand the contribution of each pillar to resilience. A resilience structure matrix presents the contribution of each pillar and identifies the most relevant pillars to the resilience capacity index, over time and amongst social groups.

Next, we applied regression analysis to report estimates and determinants of the resilience capacity index. This enabled us to determine the pillars that drove resilience change between 2011 and 2018, on the one hand, and across regions, on the other. Last, we estimated the effect of shocks on household resilience using a panel fixed-effect regression model. In each case, we ensured consistent and robust estimates by controlling for household social and demographic factors. Also, we included regional, year and agro-ecological zone-fixed effects to control for time-invariant confounders.

To assess the determinants of resilience, we estimated for pooled, urban and rural households equation (1). We estimated the resilience capacity index (RCI) of a household in year as:

$$RCI_{it} = \sum_{1}^{k} Pillars_{it} + \sum_{1}^{l} HH_{.it} + \sum_{1}^{m} FE_{.it} + \varepsilon_{it}$$

where Pillars includes ABS, Assets, AC and SSN; HH includes household size, the household head age and gender; FE stands for regional, year and agro-ecological zone-fixed effects while is the error term.

To assess the effects of shocks on household resilience capacity, we estimated equation (2) as:

$$RCI_{it} = \sum_{1}^{k} Shocks_{\,i(t-1)} + \sum_{1}^{m} FE_{.it} + \mu_{it}$$

where Shocks stands for self-reported shocks incurred by the household in year ; FE stands for regional, year and agro-ecological zone-fixed effects while is the error term.

6.2.2. Data

This investigation uses secondary data from the Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) of the World Bank (https://microdata.worldbank.org/index.php/catalog/2783). Two waves of the 2011 and 2018 survey data were compiled to track the change in the household resilience capacity index. During each wave of the survey, nationally representative data was collected. The data contained detailed household information on income, expenditure, occupation, demographic aspects, health, education, production activities, asset ownership, agricultural production, self-reported information on shocks, and several other important aspects of household economy.

While the 2011 survey included 3 969 households – 3 466 rural and 503 urban – the 2018 survey included 3 115 rural and 3 665 urban households, a total of 6 770 households. Both the 2011 and the 2018 data are representative of national, urban and rural areas of Ethiopia, since households were selected through a stratified two-stage probability sampling. For each survey year, household heads were interviewed at post-planting and post-harvest periods and the data came with a calculated sample weight, with post-stratification adjustments for each household.

The 2018 LSMS-ISA survey in Ethiopia included a limited number of 2011 households. Building cohorts based on the pseudo-panel approach, offers the best means to compare similar and stable comparison units between the two periods. We therefore used a pseudo-panel approach to build 415 cohorts of households based on age and region. The pseudo-panel method is a widely used alternative to panel data, when only independent repeated cross-sectional data is available (Russell and Fraas, 2005; Guillerm, 2017).

6.3. Results and discussion

6.3.1. Building the resilience capacity index (RCI)

We constructed access to basic services (ABS) using the household's inverse distance to a water point and a medical doctor, access to a toilet and to electricity. All these variables increased between 2011 and 2018. Access to electricity, in particular, increased by more than 100 percent while access to a modern toilet increased by 20 percent. Households also became closer to medical doctors and clean water points.

We approximated household assets using the wealth index. This takes into account all transport, cooking and livelihood materials owned; the agricultural tools index, accounting for all productive materials owned; tropical livestock units (TLU), encompassing all animals owned; agricultural land area and the use of fertilizer in food production. Overall, the wealth and agricultural tools indexes increased between 2011 and 2018. However, TLU, agricultural land area and use of fertilizer decreased between the two periods.

The social safety net (SSN) pillar includes all food and cash assistance received by a household. Between 2011 and 2018 informal transfer from family members and friends had the most significant increase, followed by monetary assistance provided by the government, particularly within the PSNP programme. We also observed a significant improvement in food and in-kind assistance received by households, which is in accordance with various findings (Bahru *et al.,* 2020; Araya, 2020; Abebe, 2020).

We estimated household adaptive capacity (AC) using head of household access to education and the inverse dependency ratio – calculated as the inverse of the number of household members aged below 14 and above 65 years, to the number of household members aged between 14 and 65 years. This pillar also includes an agricultural diversity index, accounting for all crops grown by the household, and an income diversity index, calculated from all income sources. While the income diversity index and inverse dependency ratio increased, other variables included in this pillar decreased between 2011 and 2018.

Last of all, we approximated household food security using the food consumption score (FCS) and household dietary diversity score (HDDS). The FCS aggregates the diversity and frequency of food groups consumed in a household over the previous seven days, which is then weighted according to the relative nutritional value of the consumed food groups (INDDEX Project, 2018). The household dietary diversity score is a qualitative measure of food consumption that reflects household access to a variety of foods. The HDDS is not meant to be used in assessing dietary diversity at individual level (FAO, 2021). While the household dietary diversity score did not significantly change, the food consumption score did increase between the base and reference years.

Table 1: T-test results between 2018 and 2011 means for variable used in building RCI pillars

Pillars	Variables	Means		Difference	St. Err.	t-value
		2011	2018			
ABS	Inverse distance to water point	0.033	0.143	0.11***	0.011	9.85
	Access to toilets	0.459	0.568	0.108***	0.025	4.4
	Inverse distance to medical doctor	0.191	0.379	0.188***	0.04	4.75
	Access to electricity	0.202	0.501	0.298***	0.024	12.45
	Wealth index	0.06	0.144	0.084***	0.007	11.3
Assets	Agric. tools index	0.088	0.097	0.008*	0.005	1.65
	Tropical livestock units	2.841	2.776	-0.065	0.204	-0.3
	Agriculture land area	0.698	0.382	-0.316***	0.05	-6.4
	Use of fertilizers	0.477	0.244	-0.233***	0.033	-7.1
SSN	Cash assistance (amount in LC)	330.4	1494.5	1164.11***	63.393	18.35
	Informal transfer (amount in LC)	479.4	2197.8	1718.45***	472.9	3.65
	In-kind assistance (amount in LC)	36.46	110.31	73.847***	11.931	6.2
	Food assistance (amount in LC)	495.0	1021.6	526.596***	83.899	6.3
AC	Access to education	0.399	0.123	-0.276***	0.021	-13.15
	Inv. dependency ratio	1.397	1.621	0.225***	0.054	4.15
	Ag. diversity Index	0.119	0.105	-0.014***	0.007	-1.9
	Income diversity index	0.352	0.537	0.185***	0.009	20.6
Food security	FCS	6.065	6.232	0.167***	0.043	3.9
	HDDS	39.37	39.573	-0.2	0.338	-0.6

Difference represents 2018 means – 2011 means. ***: $p < 0.01$; **: $p < 0.05$, *: $p < 0.1$.

Source: Authors computation based on LSMS data.

6.3.2. Change in resilience during the last decade

Computed statistics reveal a positive change in resilience over the last decade (Table 2). On average, resilience to food insecurity increased by 9 percent between 2011 and 2019. While all the resilience pillars improved, social security nets, adaptive capacity and assets came out on top. Meanwhile, access to basic services witnessed the least change. Based on the resilience capacity index structure reported in Figure 9, we observe a more balanced resilience capacity index in 2018 as compared to 2011 and

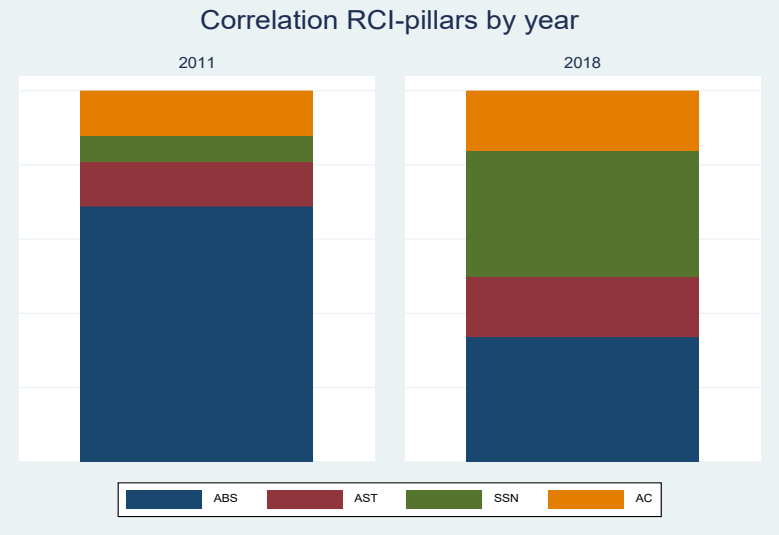
while all pillars improved, the weight of social security nets, adaptive capacity and assets had increased by 2018.

Table 2: Two-sample T-test results for change in RCI and its pillars between 2011 and 2018

Group	Variables	Means 2011	Means 2018	Difference	St. Err.	t value
RCI	Resilience capacity index	22.564	24.485	1.92***	0.425	4.5
Pillars	Assets	-1.107	0.581	1.688***	0.434	3.9
	Access to basic services (ABS)	-0.287	0.201	0.487***	0.037	13.05
	Social safety nets (SSN)	-0.377	0.415	0.791***	0.063	12.55
	Adaptive capacity (AC)	-1.107	0.581	1.688***	0.434	3.9

Source: Authors computation based on LSMS data.

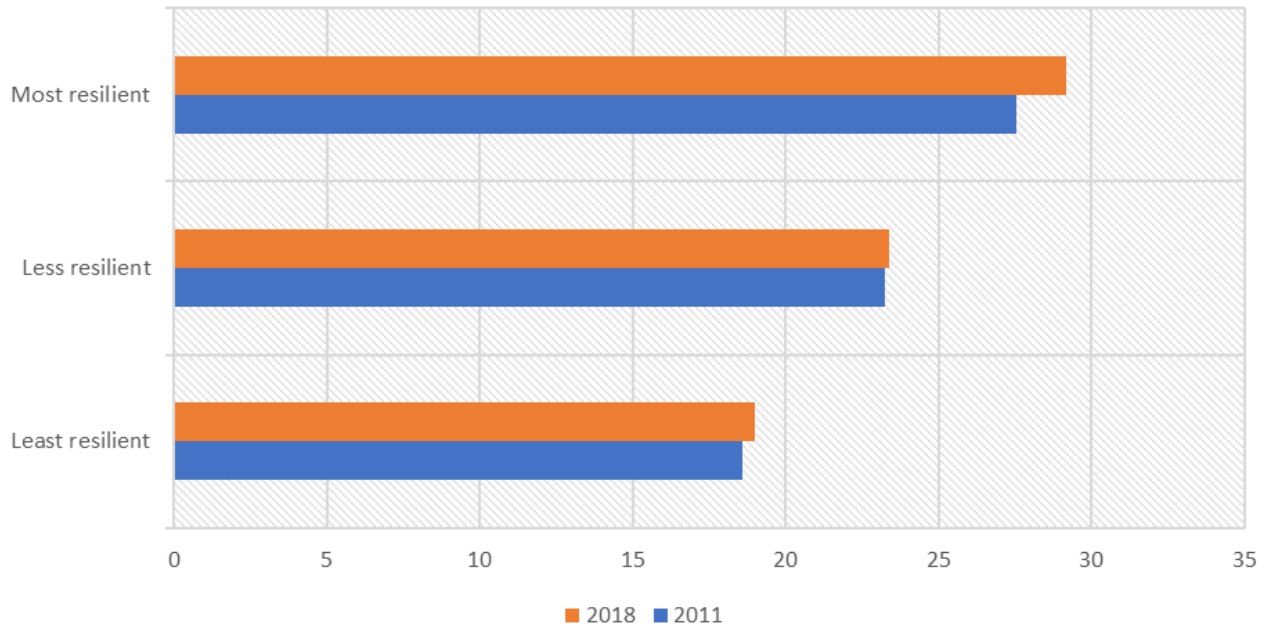
Figure 9: Relative importance of pillars in household RCI for 2011 and 2018



Source: Authors computation based on LSMS data.

To understand which group of households can cope with shocks and stressors, and to curb food insecurity, classes of resilience were created based on terciles of the resilience capacity index – distribution, gender, and place of living (rural versus urban). From these terciles of the RCI, a comparison revealed significant growth in the average resilience capacity of the most resilient (6 percent) and least resilient (2 percent) households. However, the mean resilience capacity of the less resilient households remained more or less unchanged between 2011 and 2018 (Figure 10).

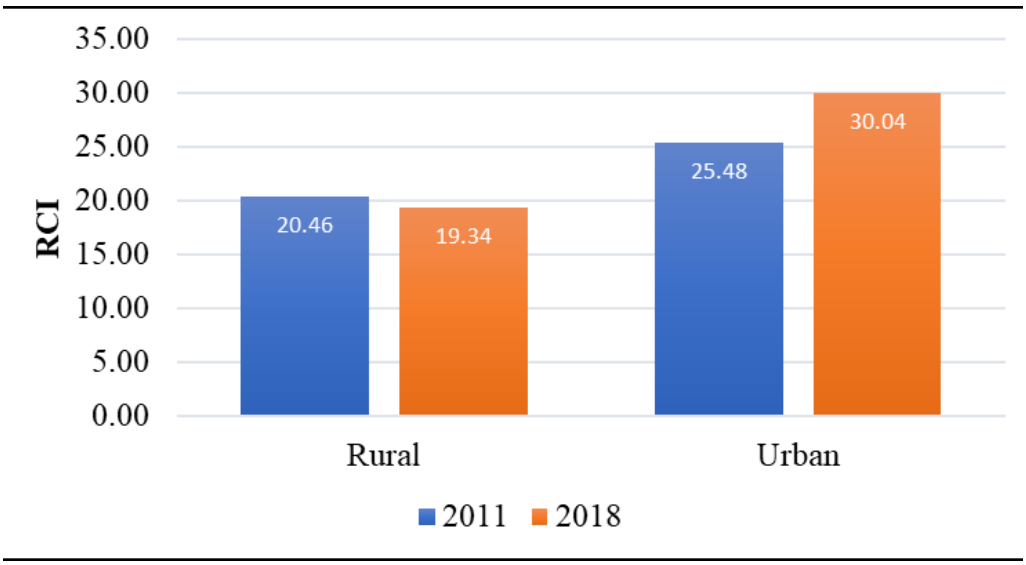
Figure 10: Comparing resilience capacity between 2011 and 2018 for RCI terciles



Source: Authors computation based on LSMS data.

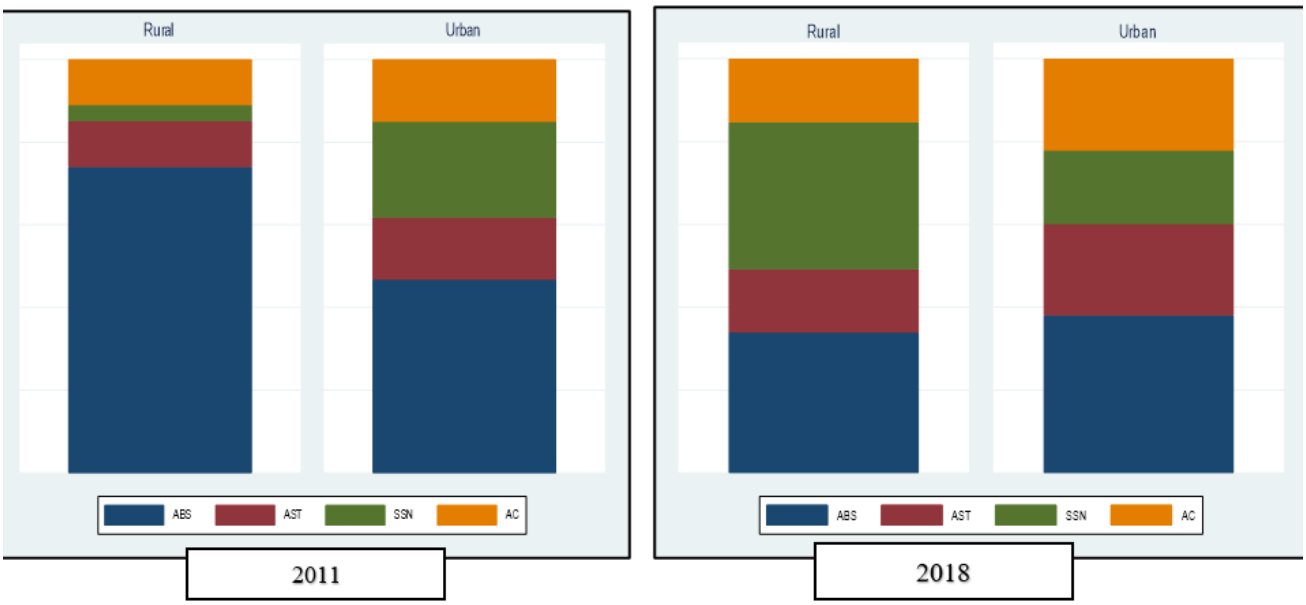
We compared the resilience capacity index between rural and urban households. Overall, and for both 2011 and 2018, the RCI is higher for urban households. While rural dwellers witnessed reduced resilience, their urban counterparts improved their resilience between 2011 and 2018. In 2011, social security nets and access to basic services were the two leading pillars for rural households' resilience while access to basic services and assets were the leading pillars for urban dwellers. While access to basic services remained dominant in the rural household resilience capacity index in 2018, other pillars remained relatively important for shortterm resilience building in urban areas. It appears that the cashforwork and food assistance programs, included in the PSNP, contributed to strengthening social safety nets, particularly in rural Ethiopia, as reported by Abebe (2020).

Figure 11: Change in resilience for urban and rural households



Source: Authors computation based on LSMS data.

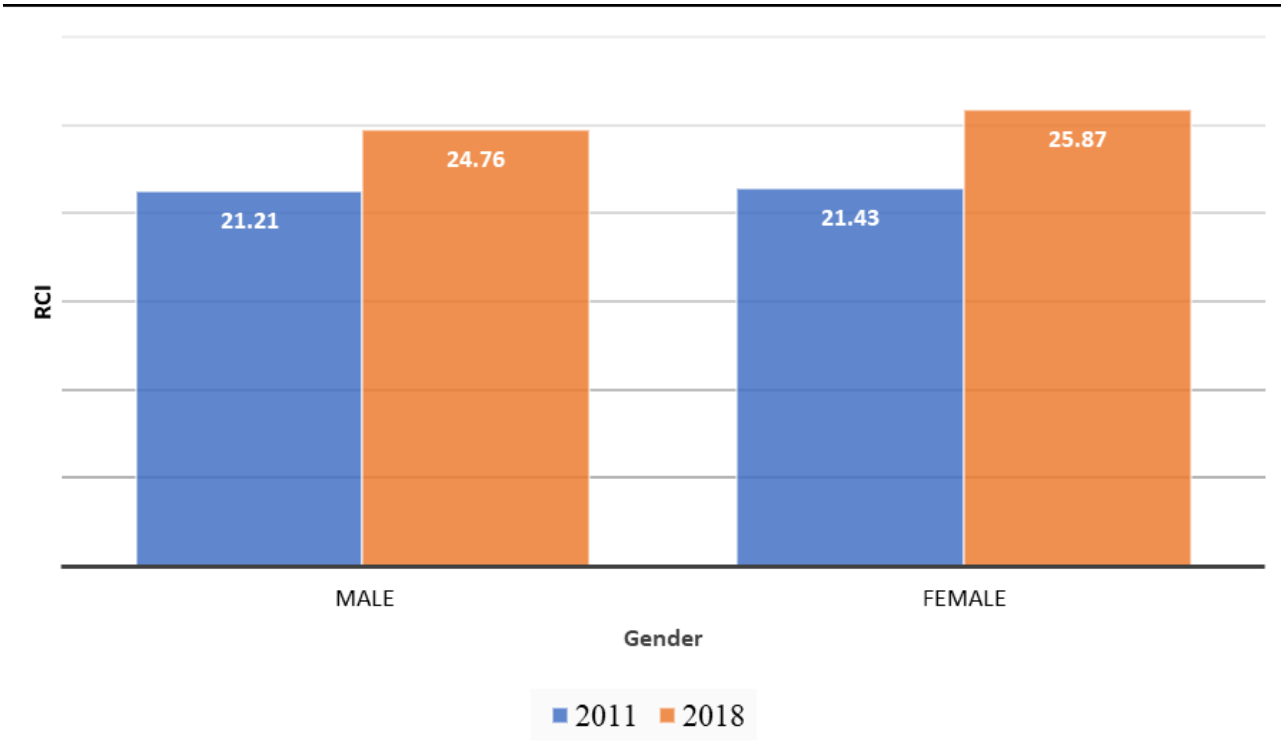
Figure 12: Relative importance of pillars in RCI for urban and rural households



Source: Authors computation based on LSMS data.

We found no significant difference in the resilience capacity index between maleheaded and femaleheaded households. For both groups, RCI increased between 2011 and 2018, as suggested by Figure 13. While access to basic services was the most important pillar in 2011, the RCI structure had balanced by 2018. Male-headed households dominated the social security nets pillar in 2018, whereas access to basic services remained the most important resilience capacity index component for femaleheaded households in 2018.

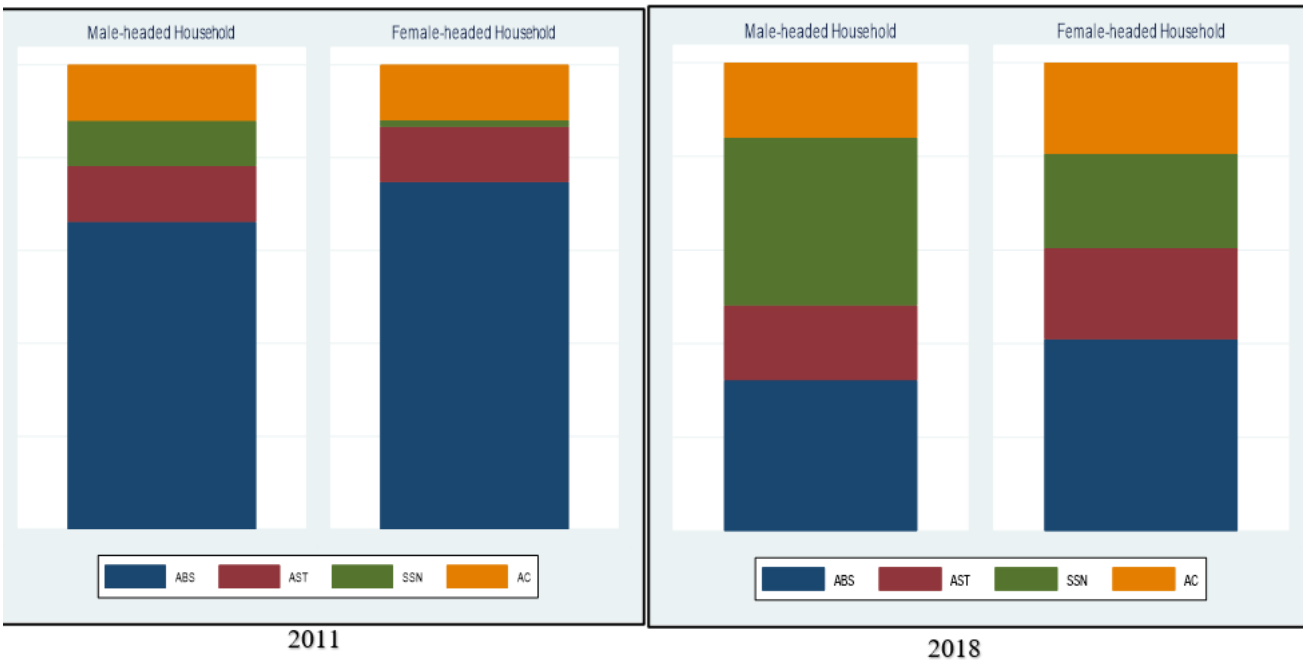
Figure 13: Change in resilience for male and female-headed households



Source: Authors computation based on LSMS data.

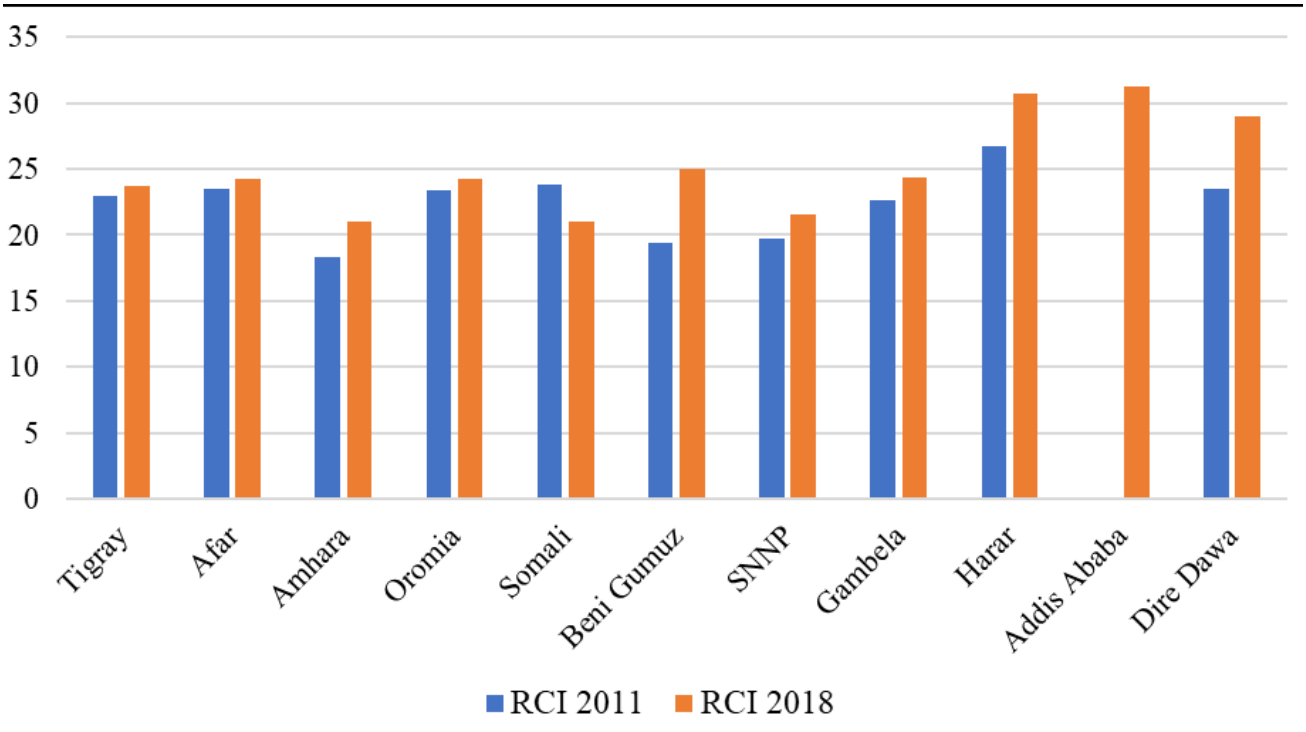
The analysis of resilience across regions reveals the more urbanized regions of Addis Ababa, Harar and Dire Dawa as the top three leading regions. On the other hand, the mostly rural regions of Amhara and SNNP report the lowest household resilience index. With the exception of Addis Ababa (which is missing 2011 data) and Somali, we found a positive change in the resilience index for all regions across the country. The increase in resilience is most notable for Harar, Beni Gumuz and Dire Dawa.

Figure 14: Relative importance of pillars in RCI for male and female-headed households



Source: Authors computation based on LSMS data.

Figure 15: Average household RCI across regions in 2011 and 2018



Source: Authors computation based on LSMS data.

Figure A1 (Annex) reports resilience structure across regions in 2011 and 2018. In line with the resilience structure observed at national level, there was a structural change in resilience between 2011 and 2018. While access to basic services was the most important pillar in Beni Gumuz, Oromia, Somali and Afar in 2011, adaptive capacity and social security nets were more so in Beni Gumuz and Afar in 2018. These findings concur with evidence reported by Nakamura *et al*. (2020) on the role of road building and povertyreduction programs in rural Ethiopia. Also, the weight of access to basic services balanced in Oromia while social security nets shrank in Somali in 2018. The social security nets pillar gained in relative importance in Afar and Tigray, suggesting an increased impact of the PSNP to resilience building in these regions. In the regions of Gambela and Harar, the assets pillar gained importance in the household resilience structure between 2011 and 2018.

6.3.3. Determinants of household resilience to food insecurity

We used the panel fixed-effect model to estimate the determinants of resilience at household level. We estimated three models, model (1) or pooled, includes all households; model (2) or rural, includes only rural households; and model (3) or urban, includes only urban households. Results for the pooled sample suggest that assets, access to basic services and adaptive capacity are the three pillars which significantly determine resilience to food insecurity.

While assets owned was negatively associated with resilience, particularly for urban households, access to basic services and adaptive capacity positively contributed to the resilience index. This confirms findings by Nakamura (2020) relating to the significant contribution of road building in strengthening access to basic services-induced resilience in Ethiopia. The social security nets pillar is positively and significantly associated with resilience in rural and urban areas. This implies that the social security nets programmes, including PSNP, positively contributed to resiliencebuilding for resource-poor households, as suggested in previous studies (Tafesse, 2020; Abebe, 2020; Bahru, 2020). From the pillars' estimates, it follows that a short resiliencebuilding approach would focus on access to basic services and to fostering adaptive capacity. However, a longterm approach to resiliencebuilding in Ethiopia would require bold efforts in improving household productive assets and access to social security nets.

The estimated models also reveal that large households, as well as female and elderlyheaded households have lower resilience to food insecurity. These findings apply to both urban and rural households in Ethiopia. We also found disparities based on agro-ecological zones, which is in line with evidence reported by Knippenberg and Hoddinott (2019) and Nakamura (2020). Results suggest that households in warm/subhumid, cool/arid, and cool/subhumid zones exhibit higher resilience to food insecurity as compared to those in the warm/arid zone. The regional estimates show that, over the last decade, households in Afar, Oromia, Somalia, Harar and Dire Dawa have been more resilient than those in Tigray. Nevertheless, households in SNNP and Amhara are found to be less resilient to food insecurity than their Tigray counterparts.

Table 3: Estimates of the resilience determinants

Variables	Pooled	Rural	Urban
Asset	-1.432***	-0.163	-6.103***
	(0.119)	(0.100)	(0.281)
Access to basic services	3.218***	1.607***	1.983***
	(0.122)	(0.182)	(0.190)
Social safety net	0.3133	0.210***	0.513***
	(0.0786)	(0.0786)	(0.191)
Adaptive capacity	0.0327***	0.0651***	0.0285
	(0.0115)	(0.00878)	(0.0202)
Adult-equivalent scale for HH	-1.384***	-1.305***	-1.756***
	(0.0518)	(0.0585)	(0.0926)
Household head age (years)	-0.0252***	-0.0106	-0.0442***
	(0.00628)	(0.00698)	(0.0119)
Female head of household (base = male)	-0.547**	-0.199	-1.178***
	(0.263)	(0.339)	(0.379)

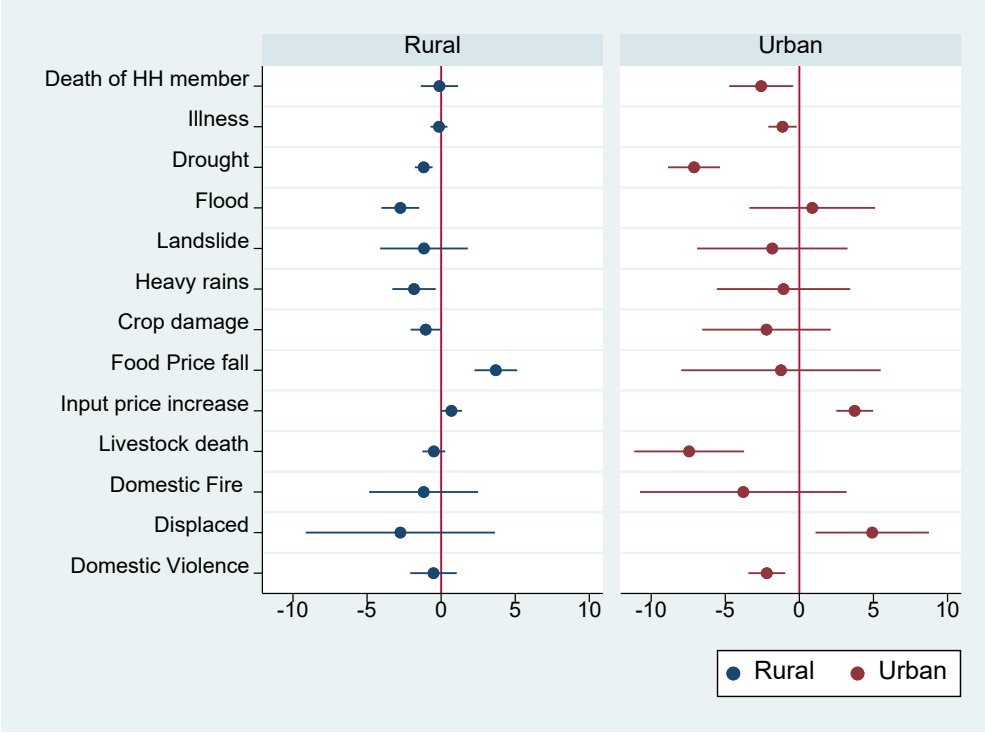
This table includes the estimates of resilience pillars, household socio-demographic and economic variables, as well regional, agro-ecological zones, and year dummies on RCI, using a panel-fixed effect OLS model. Standard errors are robust to heteroskedasticity. The dependent variable is RCI. Robust standard errors are in parentheses. ***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$.

Source: Authors computation based on LSMS data.

6.3.4. Effects of shocks on the resilience capacity index

We estimated the effect of social, agronomic, and economic shocks on household resilience to food insecurity. As with the previous model, we carried out an analysis on rural and urban households to compare how each shock impacts households in both areas. We saw that drought, flood, heavy rains, crop damage, price fall of commodity and farm inputs, and livestock death are all closely associated with householdlevel resilience. These findings are in line with those reported by Knippenberg and Hoddinott (2019). That said, price fall (of commodity and farm inputs) is positively associated with both urban and rural household resilience. The positive effect on farm input price estimates imply the net benefit incurred by farmers due to decreased production costs following input price fall. Similarly, the reverse association between commodity price and the resilience index relates to the increase in welfare induced by the reduced consumption budget. This latter relationship may also imply that most urban and rural households are net food buyers. The greater impact of commodity price fall on the resilience capacity index may relate to the greater proportion of food consumption as part of Ethiopian household budgets.

Figure 16: Estimates of effect of Shocks on RCI



This figure maps the estimates of shocks on RCI, using a panel-fixed effect OLS model. The dependent variable is RCI, and the covariates are dummies for each individual shock. The model includes year and region fixed effect.

Source: Authors computation based on LSMS data.

6.4. Conclusion and policy recommendations

This section depicts the change in resilience and resilience structure over the last decade. Our estimation revealed a 9 percent growth in household resilience to food insecurity that occurred between 2011 and 2018. Overall, access to basic services (ABS) driven by access to electricity and reduced distance to medical services, as well as water points, is the key factor contributing to household resilience for both rural and urban households. Also, we found the role of social safety nets (SSN) and adaptive capacity (AC) to be critical for household resilience capacity. Short run efforts to strengthen resilience capacity might leverage on access to basic services (ABS). In the mid and long run, bold efforts are required for social safety net (SSN) programmes in rural areas and adaptive capacity (AC) building in urban livelihoods.

The investigation showed that shocks have a significant and negative effect on household resilience capacity. Specifically, stressors such as drought, flood, crop damage, livestock death, and increased inputs and commodity prices are detrimental to resilience capacity. It follows that diversification of income sources, access to productive and non-productive assets (including agricultural tools, land and livestock), as well as cash and in-kind transfers are critical to ensure a household's capacity to bounce back after a shock (see Adaptive capacity in 2018, Figure 9). Given the global climate change context, combining the aforementioned interventions with improved access to education, water and health services, and fostering livestock production and access to fertilizers, may sustainably contribute to building long-term resilience.

We found urban households to be more resilient than their rural counterparts. Accordingly, we found the more urbanized regions such as Addis Ababa, Harar and Dire Dawa to exhibit higher resilience.

While rural resilience remained at the same level, we observed a significant increment in urban households' resilience. Gender-wise, this investigation revealed female-headed households to not only be more resilient, but also to have incurred a higher improvement in resilience between 2011 and 2018. For all groups, resilience interventions are essential to address imminent shocks and strengthen household adaptive capacity.

Overall, this quantitative investigation cast light on areas of good practice, as well as complexities surrounding the household-level resilience capacity. Through improved access to basic services and capacity-building, governments and development agencies can foster responsiveness to food insecurity. The evidence suggests that household-level interventions such as PSNP contributed to resilience-building and should therefore be strengthened and scaled up. Specifically, this investigation highlighted the need for pro-poor interventions targeting rural, the less and least-resilient households.

7. Lessons learned: drivers for effective response and resilience-building

7. Sustained economic growth

The importance of promoting resilience has become increasingly recognized, especially in light of recurrent natural and human-induced shocks, and now COVID-19. Resilience is enhanced by the factors that drive transformation, such as sustained and equitable economic growth, human capital development, improved governance, and political and economic inclusion. Since the mid1990s, Ethiopia has pursued policies and strategies that have helped the country to realize strong economic growth, relatively successful macroeconomic stabilization, major investments in the welfare and livelihoods of its people, significant national poverty reduction and increased resilience to shocks.

In Ethiopia, agriculture and the broader agrifood system remain the primary source of livelihoods, employment and income. Thus, Ethiopia has emphasized agriculture in its development strategy by developing and implementing an Agriculture Development-led Industrialization (ADLI). It has sustained the increase in investment in the agricultural sector, which has promoted agricultural productivity and contributed to enhanced resilience both at household level and the economy as a whole. Ethiopia allocated an average of 9.4 percent of the national budget to agriculture between 2001 and 2017 (FAO, 2020). It allocated much more on pro-poor sectors, including agricultural research and the largest extension and advisory system in Africa; it improved access to credit through micro-finance institutions; improved capacity of the National Meteorological Service Agency and climate related information; increased use of fertilizer and enhanced access to improved seeds; built rural infrastructure; established effective social safety nets, developing water resources, health and education.

As a result, agricultural output more than tripled, with growth averaging more than 5 percent per year between 1993 and 2018 (Jayne *et al.,* 2021). Based on the national poverty line, poverty decreased from 46 percent in 1996 to 24 percent in 2016 nationwide and the percentage of under-five children suffering from stunting fell from 67 percent in 1992 to 37 percent in 2019 (World Bank, 2020). Despite these achievements, the agricultural sector is still susceptible to shocks and stresses, as it largely depends on rainfed subsistence farming. This implies that sustaining successes in building resilience in Ethiopia, in view of recurrent natural disasters triggered by climate change and human displacement as a result conflict, requires further interventions. These interventions should improve sustainable land and natural resource management, expand the area under irrigation, improve market access, continue to strengthen the extension system, conflict resolution and peacebuilding.

Ethiopia has long recognized that building resilience to a complex combination of natural and human-induced disasters should be integral to national development. Therefore, mainstreaming disaster risk management into national development planning and sectoral development strategies is an essential condition for economic transformation. Accordingly, major development strategies such as the PASDEP, the CRGE strategy and the GTP do incorporate some elements of disaster risk management.

Furthermore, sectoral strategies, such as Ethiopia's agricultural sector Policy and Investment Framework (PIF) (2010–2020), food security strategies, the National Social Protection Policy of Ethiopia, education and health sector strategies, The National Adaptation Plans and the Nationally Determined Contribution (NDC), implicitly incorporate disaster risk management tools and activities. Examples of such activities are risk assessments, early warning and prevention, disease surveillance, capacity development, and emergency preparedness and response. In so doing, lives are saved and quality of life improved with no or minimal disruption to daily life.

Therefore, mainstreaming disaster risk management into main economic and social sectors has contributed to Ethiopia's progress towards building the resilience of its economy and people to shocks and threats, protecting the most vulnerable people and their livelihoods.

7.2. Productive Safety Net Programme (PSNP)

The Productive Safety Net Programme (PSNP) is one of the Government of Ethiopia's (GoE) flagship reform programmes and represents a significant transformation of the Government's strategy for providing transfers to food insecure households in chronically food insecure regions, in a way that prevents asset depletion at the household level, while stimulating local markets, improving access to services, rehabilitating and enhancing natural resources and the environment. Launched in 2005, after large scale and intensive consultation, the PSNP represents an innovative attempt on the part of the Government of Ethiopia to move away from responding to chronic hunger through emergency appeals, towards a more predictable response with predictable resources for a predictable problem (ODI, 2006). The PSNP aims to refocus the government's and international partners' approach to food insecurity by shifting it away from meeting short-term food needs through emergency relief, towards addressing the underlying causes of household food insecurity.

Initially designed to support about 5 million chronically food insecure beneficiaries, the PSNP provided safety net support to almost 7.6 million rural Ethiopians at the end of its first phase 2005–2009. Average estimated annual transfers to both the Direct Support and the Public Works beneficiaries were USD 137 per household per year, with an annual cost of USD 206.8 million (World Bank, 2009). The PSNP 4 (July 2015–June 2020) was designed to benefit an estimated 10 million vulnerable (8 million chronically food insecure and 2 million transitory/seasonal food insecure) people with a total budget of USD 2.3 billion. Building on the successes and lessons learned from the previous phases, the PSNP 5 proposes more enhanced and comprehensive service delivery design to improve the well-being and resilience of poor and vulnerable households, particularly in drought-prone communities. It seeks to ensure the recent gains in poverty reduction are supported with expanded job creation, asset building and complementary livelihood support packages.

Various impact evaluation reports, largely sponsored by the donors of the programme – including USAID, DFID and the European Union (EU) – concluded that the PSNP has had transformative effects on people and households in rural areas of Ethiopia who were previously suffering from regular food shortages. The overall programme assessment suggests that it is not only the cheapest safety net programme in terms of annual cost per beneficiary household, with a median cost–benefit ratio (CBR) of 4.42 (USAID, 2018),[61] but that it has also helped its core beneficiary households to smooth consumption and avoid panic-selling of productive assets during a time of crisis. At the same time, significant improvements in management of the natural environment through public works, such as terracing and other watershed rehabilitation, have reduced erosion and flooding risks, improved infiltration, replenished water tables and enabled the introduction of small-scale irrigation, thereby boosting household and community resilience to natural and human-induced disasters.

However, even though the initial design of the PSNP shows a clear path for households to move out of food insecurity after some years of support, for consumptionsmoothing and asset-building, various reports confirm that the level of graduation of households is very low, with a high risk of falling back into poverty. Some authors have attributed this low level of graduation to a lack of appropriate indicators and criteria to guide the process and there is in fact a fair amount of confusion in understanding the process among implementors. Furthermore, the exclusive focus on agricultural

[6] A CBR above one indicates that the avoided cost of aid required to fill the humanitarian deficit is greater than the additional cost of safety net/resilience programming.

livelihoods, particularly on-farm activities, has limited the potential pathways out of food insecurity. The emphasis of the fifth Productive Safety Net Programme (PSNP 5) on expanding job creation through investment in sectors such as infrastructure and education, and transition into private sector-led growth, may minimize the challenges related to identifying reliable parametric indicators for graduation.

7.3. Early warning system and coordination of response/actors

The history of the Early Warning System (EWS) in Ethiopia can be traced back to 1995 with the establishment of the Disaster Prevention and Preparedness Commission (DPPC) and the ramification of the National Policy on Disaster Prevention and Management (NPDPM), which articulated the need to develop an early warning system (EWS) as a crucial component of disaster risk management. Since then, various attempts have been made to strengthen the EWS through capacity-building and technology. This enables a large amount of data to be collected continuously to monitor food production and other key indicators for example: rainfall condition; crop condition; migratory pests; input supply; livestock condition; flash and seasonal river floods; conflict; forest fire outbreaks; livestock disease outbreaks; grain, livestock and other commodity prices; coping mechanisms; and state of emergency relief responses. The information is fed into decision-making processes for the classification of affected areas/weredas and relief allocation with adequate lead-time.

The early warning system in Ethiopia involves the active participation of multiple sectors including the NDRMC, Meteorology, Health, Agriculture, NGO representatives and intergovernmental organizations, including FAO. The system is considered to be well coordinated, at various government levels (National, Regional, Zonal and Wereda), and follow sound governance structure with appropriate action plans. It recognizes that unless information received, regarding short- and long-term risks associated with natural and human-induced disasters, is shared by the appropriate agencies, the early warning system becomes unsuccessful in mitigating the impact of disasters on society, economies, and the environment.

Accordingly, the Early Warning and Emergency Response Directorate of the NDRMC, in cooperation with domestic and foreign information sources, is responsible for a number of tasks, including: monitoring; forecasting and warning against disasters that could affect the agricultural sector and livelihoods; creating, strengthening and administering stand-by capacities over selected and strategic areas to ensure a timely, effective and appropriate response against rapid disaster onset and other disasters of national concern; taking appropriate and timely measures in cooperation with concerned bodies, before, during or after a disaster, whether a threat or occurrence of disaster; promoting people-centred and decentralized DRM approaches; providing capacity-building support for its operationalization and effectiveness; and promoting information and other technologies that support the early warning and response system. Such responses with a clear mandate have contributed to the capacity of early prediction, preparation and early response action whenever there is impending natural and human-induced disasters.

Furthermore, the recognition that no single organization, ministry, donor or sector can respond effectively to disasters alone, along with the need to align emergency humanitarian assistance to longterm resiliencebuilding, led to the establishment of a coordination mechanism called the Rural Economic Development and Food Security Sector Working Group (REDFS SWG). The REDFS SWG has helped the synergy between agricultural and natural resource management with that of disaster risk management programmes. It is government initiated, while led and supported by partners, and such an institutional arrangement is considered unique within Ethiopia. It ensures that disaster risk management activities in the country are well synchronized and coordinated in view of the number of sectors and agencies involved – hundreds, if not thousands, of NGOs are engaged in

delivering various humanitarian assistance. Consequently, this multilevel, multisector and multiactor coordination structure, across government agencies and their development partners and NGOs, as well as emergency food reserves, has been central to effectively managing natural and human-induced disasters in Ethiopia in recent years.

7.4. Focus on the most vulnerable livelihoods – pastoral livelihoods

Pastoralists comprise a significant part of Ethiopia's population, accounting for some 12 percent of the total population of about 110 million, while occupying about 60 percent of the total land mass (Gebremeskel *et al.,* 2019). Located largely in the eastern and southern parts of the country, bordering Djibouti and Somalia to the east and Kenya to the south, pastoralists are among the most vulnerable in Ethiopia.

In the past, pastoralists in Ethiopia have been economically, socially and politically marginalized because of inadequate attention by policy-makers. But this seems to have changed recently as the Government of Ethiopia (GoE) and its development partners have recognized the need to build resilience of households and communities in arid and semi-arid regions of the country. Accordingly, various efforts have been made to address the challenges faced by pastoral and agro-pastoral populations. These efforts have been largely project-based and ranged from increasing productivity of livestock resources through to improvement in breeding, feed sources and provision of basic services, including control of livestock disease and enhanced trading opportunities. The impact has, however, been compromised by a lack of clear policies and strategies, inadequate investment and support systems, as well as institutional fragmentation, violent conflict and recurrent droughts (Gebremeskel *et al.,* 2019).

In October 2020, the Council of Ministers of the Federal Democratic Republic of Ethiopia approved the first-ever *Pastoral Development Policy and Strategy.* The document is meant as a framework for a new set of similar policies to be produced at regional level with a view to enhancing socio-economic conditions, thereby transforming livelihoods of pastoralists. Its overarching objective is to realize improved and sustainable livelihoods for people in pastoral areas through integrated development that is centred on animal resources, local knowledge and the environment.

Even though Ethiopia has a long history of implementing pastoral development projects, the 2011 drought was a stark reminder that insufficient attention has been given to addressing livelihood vulnerability in the pastoral and agro-pastoral regions, which would strengthen medium- and long-term resilience to disaster and ensure that future disasters do not result in crises. Among the notable projects is the Pastoral Community Development Project (PCDP). PCDP was a three-phase, 15 year project aimed at improving livelihoods of pastoralists on a sustainable basis while reducing their vulnerability to cyclical climatic shocks. Furthermore, the GoE adopted the Regional Pastoral Livelihood Resilience Project (RPLRP) in 2013. RPLRP envisaged enhancing resilience to external shocks and avoiding adverse environmental or social consequences, with particular focus on the Arid and Semi-arid land (ASAL) communities in Ethiopia, by implementing community investment and rural livelihood sub-projects.

Cognizant of the untapped potential of the livestock and fisheries sector, the MoA of the GoE, in partnership with the World Bank, is currently implementing the Livestock and Fisheries Sector Development Project (LFSDP). The LFSDP is aimed at increasing productivity and commercialization of producers and processors in selected value chains, strengthening service delivery systems in the livestock and fisheries sectors, and responding promptly and effectively to crisis or emergencies that affect the livelihoods of livestock keepers. In so doing, the project aims to improve the contribution of the livestock and fisheries sub-sector to economic growth, improve household income, reduce poverty, and improve food and nutrition security. The project targets

four priority value chains: (i) dairy with small-scale mixed-crop livestock systems; (ii) poultry with improved semi-scavenging and small-scale broiler and layers systems; (iii) red meat in small ruminant systems and dairy beef; and (iv) fish with sustainable inland fisheries and aquaculture in selected suitable areas. It is envisaged that the project will directly benefit an estimated 1.2 million smallholder livestock and fisheries producer households, associations and processors (ILRI, 2020).

Various reports confirm that these projects have improved the early warning system and contributed to the construction of schools, the development of human and animal health posts, as well as small-scale irrigation, rural roads, improved fodder production and management, and enabled millions of people to gain improved access to potable water.
Scarcity of feed and water are the main causes of livestock mortality due to drought. As such, livestock monitoring tools, encompassing the Animal Feed Balances, Predictive Livestock Early Warning System (PLEWS), Pictorial Evaluation Tool for early warning and early action for optimal utilization and improved supply of feed, is being rolled out in the country. Despite these interventions having contributed to addressing the causes of pastoral vulnerabilities, helping pastoralist communities cope with emerging change by adapting and diversifying their livelihoods and by managing their ecosystems to withstand future shocks, they still remain far from being able to withstand the effect of natural and human-induced disasters.

7.5. Conflict reduction and peacebuilding

The United Nations International Strategy for Disaster Reduction (UNISDR, 2020) proposes the humanitarian–development–peace (HDP) nexus for a comprehensive response to protracted crises and has piloted it in a variety of contexts, particularly in protracted displacement situations. The nexus aims to strengthen "collaboration, coherence and complementarity" between humanitarian, development and peace interventions "to reduce overall vulnerability and the number of unmet needs, strengthen risk management capacities and address root causes of conflict" (OECD, 2019). The HDP focuses on the work needed to coherently address people's vulnerability before, during and after crises. It challenges the status quo of the aid system, which is overstretched and operates with little coordination between project-based development and humanitarian interventions, resulting in the needs of the most vulnerable not being effectively met (OXFAM, 2019).

Furthermore, there is growing recognition of the inter-relationship between resource scarcity, climate change and conflict in Ethiopia. Ethnic polarization, weak institutions, fragile political systems and divisive social relations have all contributed to the perpetuation of cycles of violent conflict in some regions. Field experiences are demonstrating that these dynamics are often particularly acute in pastoralist areas, including Afar, Somali and the southern part of Oromia region. It is important, therefore, that the Government of Ethiopia (GoE) and its development partners have tried to frame and understand how resource scarcity driven conflicts may affect security and stability, and how dynamics of conflict, fragility and peace may either support or hinder efforts to address long-term resilience-building.

The need to address the challenges that these situations entail is a prominent concern for the GoE. In terms of the humanitarian response to disasters, the development and peacebuilding nexus can help avoid unintended outcomes that undermine the Government's objectives in resilience-building in the pastoralist areas and illuminate opportunities to strengthen efforts to promote both peace and effective disaster risk management.

Over the last decades, the Ethiopian Government has adopted a number of innovative and effective mechanisms to integrate non-violent conflict resolution arising from a complex interaction of factors that could include resource scarcity, drought and ethnic polarization. Intervention projects in arid

and semi-arid lands are needed to integrate issues that relate to land, water and natural resource management, an improvement in the capacity of land and natural resources, and capacity-building of national stakeholders in conflict prevention and management. This will serve to support communities in the arid and semi-arid zones in their quest for a secure and more resilient future.

8. Conclusions and strategic pathways to enhance resilience to natural hazard and human-induced disasters

8.1. Conclusions

This report has documented the gradual recognition of importance of integrating a long-term development perspective in responding to natural hazards and human-induced disasters. It has summarized some regional experiences in building resilience to multiple hazards and in integrating resilience-building into development policy and planning. It has laid out the evolution and institutionalization of disaster risk management in Ethiopia and detailed the efforts made by different Ethiopian governments to adopt appropriate institutional architecture, policies, strategies and programmes in order to guide effective early warning and response actions. Finally, it has outlined the drivers of success to resilience-building.

Ethiopia is a country that has experienced sustained economic growth and poverty reduction, largely attributed to public sector investment in the agricultural sector, the adoption of conducive policies for public-private-partnership, increased investment in research and extension, increased use of fertilizer, improved seed varieties, and relative political stability. But it started the journey from an extremely low base and still remains highly dependent on rain-fed agriculture which is vulnerable to climate change and variability related risks. Ethiopia is also faced with prominent conflict leading to displaced households across the country. Nevertheless, over the last three decades, the country has adopted a number of innovative and effective mechanisms to increase household, community and national resilience to shocks and stress. Over the past two decades, in particular, Ethiopia has avoided widespread famines despite having faced droughts more severe than those that triggered famines in the 1970s and 1980s. However, Ethiopia is still confronted with limits due to the low level of infrastructure development and private sector investment, recurrent drought, land degradation and conflict.

The report also provides clear evidence that building resilience to natural and human-induced disasters is not a one-off intervention, but rather requires long-term commitment and persistence from multiple agencies, policies and strategies. Any long-term intervention must be consistent with prevailing situations and coordinated by an institution that has disaster risk management as its core purpose, with concomitant decision-making power and adequate resources. The findings also suggest that strategies and interventions that aim to tackle poverty and food insecurity should empower local institutions that can generate reliable early warning information on natural and human-induced emergencies.

Furthermore, there is growing recognition that despite emergency humanitarian assistance having saved lives during drought years, it has not provided adequate protection for livelihoods, which could result in millions of people sliding into poverty. Consequently, innovative interventions, such as the Productive Safety Net Programme (PSNP), have reformed the emergency food aid system approach in favour of long-term development programs which can adequately predict needs, mobilize required resources in a timely manner and effectively target the most vulnerable – with shock-responsive flexibility to adapt to urgent risks. The PSNP approach is not only significantly contributing to building people's resilience through addressing the underlying causes of household food insecurity and vulnerability to shocks, it is also considered to be far more cost effective than meeting household needs through emergency response (USAID, 2018).

A review of relevant documents also provides clear evidence that Ethiopia's success in managing disaster-related food insecurity and resilience-building is attributed to adopting a comprehensive set of policies, strategies and programmes that deliberately target the most vulnerable segments of

communities and their natural resource base. In this respect, a focus on pastoralist communities, who predominantly inhabit the arid and semi-arid lands of Afar, Somali, Oromia and Southern Nations and Nationalities, was designed to fit in with the institutional structure. It is well recognized that the pastoralist areas are also prone to conflict and more frequently experience resource-scarcity. Various programmes were therefore designed and implemented not only to enhance the protection, restoration and productivity of natural resources through sustainable management practices, but also to better respond to the need for peace-building.

8.2. Strategic pathways to enhance resilience to natural hazard and human-induced disasters

In light of what has been presented and discussed in the foregoing sections, and building on existing strengths and opportunities, the proposals below - in no way exhaustive - provide a summary of potential measures that can systematically ensure sustainable household resilience to natural hazards and human-induced disaster risks.

- *Conflict management and peacebuilding:* Even though Ethiopia has enjoyed a relatively stable and peaceful political situation for almost the last three decades, more recently the country has faced challenges related to conflict attributed to political grievance, economic deprivation and resource scarcity. These conflicts have not only diverted public resources from sectors prioritizing poverty reduction and sustainable development to defence expenditure, but they have also had a devastating impact on assets and other resources, and eroded the resiliencecapacity of households, the nucleus in building resilience. Millions of households have been displaced and lost access to the productive assets they built over time. They have turned from surplus producers to recipients of humanitarian assistance. Conflict can also increase the cost of market transactions and limit farmers' options to routes and markets where safety can be guaranteed. Thus, in order for the country to maintain the progress made in resilience-building over the last few decades, deliberate attention must also be given to peace building capacity as an essential component of this.

  To support Ethiopia in its quest for a more peaceful and resilient country, non-violent conflict resolution of incompatible interests should be duly considered. Measures that can mitigate natural-resource-based conflicts, often multifaceted and violent in nature are, for example: the strengthening in conflict prevention and resolution of local governance institutions (both formal and informal); a public or participatory dialogue to avoid ethnic polarization; the promotion of good risk governance for environmental and transboundary natural resources (including ensuring equitable access to these resources); the adoption of an integrated approach to address needs, risks and vulnerabilities. Furthermore, conflict-sensitive programming should be fostered so that any potential negative impact of interventions on conflict dynamics is minimized while contribution to peace is enhanced.

- *Promote public and private investment in agriculture and natural resources:* As confirmed by various study reports, the GoE has maintained the allocation of a large proportion of its national budget for pro-poor sectors, including agriculture and natural resources, health, education and infrastructure. This increase in investment needs to be sustained so as to improve agricultural productivity and production, which contribute to reducing poverty and vulnerability, and bring about sustainable resilience. Public and private investments must lead to better access to modern agricultural inputs, including improved seeds, fertilizers, pesticides, herbicides and mechanization services. Investment in large- and small-scale irrigation schemes can enable households to use their available resources

more efficiently and throughout the year.

Unfortunately, it has become relatively easy to get money for food in extreme emergencies, but more difficult to help communities build their resilience. Thus, investment in agriculture should not only come from the government and big private businesses, but also from smallholder farmers. The design and adoption of policies and strategies that promote smallholder producers' associations and cooperatives can contribute to resilient livelihoods by allowing the pooling of resources to achieve scale, facilitating access to productive resources such as machinery, equipment and credit, and enhancing market power by purchasing their inputs and selling their outputs as a group and by participating in group shock-responsive risk transfer interventions. Grouped together, smallholder farmers can thus protect themselves from market fluctuations and obtain better input and higher output prices.

- *Reducing disaster risks and adapting to climate change:* The Ethiopian economy is heavily dependent on agriculture, which in turn is contingent on weather, climate and the natural resource base in order to thrive. The sector operates under multiple threats, including the increasing frequency and intensity of natural hazards and disasters related to climate change, water scarcity, and land and natural resource degradation. Promoting more sustainable production systems is an important resilience-enhancing strategy for agricultural households. Such approaches include climate-smart agriculture, disaster risk reduction, climate change adaptation at farm/field and landscape levels, including ecosystem-based disaster risk reduction (DRR), and biodiversity for food and agriculture. Climate-smart agriculture has the triple benefit of enhancing food security through increased production, productivity and income, through adaptation to climate change, and through mitigation of green-house gasses. Ecosystem-based disaster risk reduction/ adaptation involves the conservation, sustainable utilization, management and restoration of the ecosystem and reduces vulnerability to shocks and stresses, including through the adoption of farm-level DRR and climate change adaptation good practices. Biodiversity helps to conserve and use genetic resources and ensures their continued evolution, including the characterization and evaluation of traits linked with resilience. These approaches create synergies between enhancing resilience and improved productivity in a sustainable manner and within reach of smallholder farmers, as they do not entail large investment.

- *Promote access to input and output markets:* Smallholder farmers, who contribute the largest share to Ethiopian economy, can fully benefit from any intervention if they are properly integrated into both the outputs and inputs markets. The market system has numerous weaknesses to be addressed by policy makers. Smallholder farmers often travel long distances to reach market towns. They are also vulnerable to low prices due to the fact that selling options are limited because it is not practical for farmers to return home with their produce, sometimes perishable, and warehouse facilities are almost non-existent. Urban-based middlemen often take the bulk of the profit and keep farmers' prices very low. This is partly attributed to asymmetric information, where buyers possess more information than the farmers. The prevailing large gap between farmgate price and consumer price is a reflection of the lack of integration of farmers into the market. Such a gap is also a source of disincentive for those who may consider turning to farming as an activity. Thus, investment in rural infrastructure, including roads, communication and warehousing facilities, enables farmers to extract a fair share of what is their contribution to the economy. With ICT providing various opportunities, farmers should be capacitated to make use of the available information in decision making.

- *Strengthen disaster risk governance structure:* Despite Ethiopia managing to establish a dedicated organization for disaster risk management, namely the NDRMC, which ensures the implementation and coordination of day-to-day activities relating to disaster risk management, a number of sectoral ministries and partner organizations are engaged in executing largely project-based interventions. To ensure efficiency and avoid overlap of activities, strong vertical and horizontal coordination is required across all levels. Effective coordination also requires all the relevant sectors – agriculture, health, education, infrastructure – to mainstream elements of resilience-building in their respective planning and budgeting processes. Integration of agro-metrological information in the early warning and response system, as well as capacity-building and awareness-raising among farmers and extension officers on how to apply the information, should be considered as one of the priorities for building resilient and sustainable agriculture.

  Furthermore, decentralization and a people-centred early warning and response system is likely to positively contribute to the improvement/promotion of disaster risk governance by increasing local capacity and bringing in local knowledge and perspectives by way of local actor participation. Since both natural and human-induced disaster risks manifest themselves locally, the activities of local governments and non-governmental actors are believed to facilitate context-specific risk management solutions that are custom-tailored to the specific needs, wants and capabilities of local communities. Building the capacity of government at all levels will ensure better preparation and more effective response to disasters relative to a more centralized system. Accordingly, it is imperative that Wereda level disaster risk management is strengthened to enable households and communities to be more resilient to future natural hazard and human-induced disasters.

- *Emphasis on inclusion of the most vulnerable groups and environment:* As there are specific groups and regions of people who are more vulnerable to natural and human-induced disasters, tailoring interventions for such groups is of paramount importance in building effective resilience. These vulnerable groups include, amongst others, pastoralists, women and youth. Pastoralists' livelihoods are particularly risk prone, as successive droughts, conflict, market failures and disease frequently wipe out livestock, the mainstay of their livelihoods. Since most of the challenges faced by such vulnerable groups are structural and require long-term intervention, programmatic approaches that involve multiple projects will be more effective in building resilience. The programmes should ensure that the vulnerable population have access to resources, safety nets, water for humans and livestock, and agricultural activities, without compromising dignity, rights, culture and the natural environment. In this instance, vulnerable households must be able to bounce back from frequent shocks and also be provided with stable livelihoods to protect them from these shocks. Dealing with pastoralist communities also requires consideration to special service provision approaches, such as mobile schools and health centres, which may be better suited to their specific circumstances.

  Furthermore, pastoralists mainly focus on continuing livestock production with little attention to value addition or diversification. But there is an increasing need to support and promote livelihood diversification and skills development. Resilience programmes should, therefore, include interventions that promote alternative and diversified livelihoods and support local value chain development, as appropriate. Supporting pastoralists and other vulnerable households should be strengthened by business planning, training and skills development, technical assistance, and access to affordable finance to enable more effective engagement in income-generating activities.

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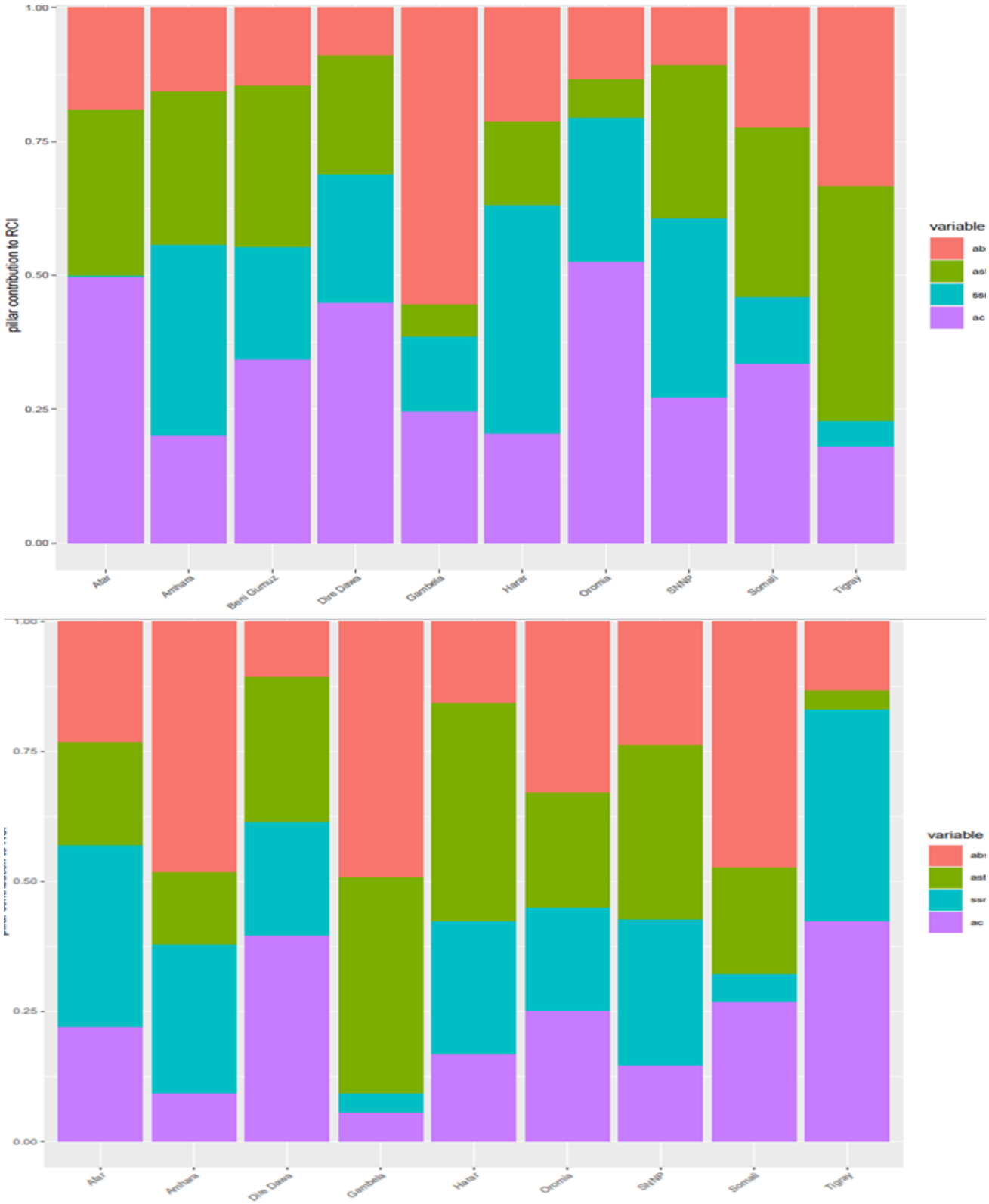
Annex

Figure A1: RCI structure across regions in 2011 and 2018



Source: Authors computation based on LSMS data.

Table A1: Estimates of the resilience determinants

Variables	(1) All households	(2) Rural	(3) Urban
Asset	-1.432***	-0.163	-6.103***
	(0.119)	(0.100)	(0.281)
Access to basic service	3.218***	1.607***	1.983***
	(0.122)	(0.182)	(0.190)
Social safety net	0.00133	-0.210***	0.513***
	(0.0786)	(0.0786)	(0.191)
Adaptive capacity	0.0327***	0.0651***	0.0285
	(0.0115)	(0.00878)	(0.0202)
Adult equivalent scale for HH	-1.384***	-1.305***	-1.756***
	(0.0518)	(0.0585)	(0.0926)
Household head age (years)	-0.0252***	-0.0106	-0.0442***
	(0.00628)	(0.00698)	(0.0119)
Female head of household (Base= Male)	-0.547**	-0.199	-1.178***
	(0.263)	(0.339)	(0.379)
Marital status (base = never married)			
Married (monogamous)	-0.509	-0.457	0.555
	(0.370)	(0.571)	(0.473)
Married (polygamous)	-0.857	-0.778	-0.281
	(0.605)	(0.741)	(1.247)
Divorced	-1.935***	-2.071***	-0.437
	(0.510)	(0.733)	(0.669)
Separated	-2.577***	-2.322**	-1.057
	(0.647)	(0.939)	(0.834)
Widowed	-2.681***	-2.033***	-1.282*
	(0.477)	(0.686)	(0.689)
Cohabiting	-1.669	-4.996**	4.437***
	(2.597)	(2.010)	(1.179)
Agro-ecological zones (base = tropic-warm/arid)			
Tropic-warm/semiarid	0.0572	-0.0259	-1.228
	(0.482)	(0.552)	(0.860)
Tropic-warm/subhumid	1.556*	-0.280	2.491*
	(0.826)	(0.970)	(1.398)
Tropic-warm/humid	1.601	1.165	
	(1.836)	(1.852)	
Tropic-cool/arid	3.222*	3.501**	
	(1.683)	(1.740)	

Robust standard errors are in parentheses; ***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$.

Table A2: Estimates of the resilience determinants (continued)

	(1)	(2)	(3)
Variables	All households	Rural	Urban
Tropic-cool/semiarid	0.781	0.682	0.327
	(0.505)	(0.600)	(0.864)
Tropic-cool/subhumid	1.300**	1.044	-0.130
	(0.573)	(0.674)	(0.984)
Tropic-cool/humid	0.975	0.467	0.695
	(0.650)	(0.750)	(1.199)
Region (base = Tigray)			
Afar	0.965**	1.700***	1.576**
	(0.452)	(0.540)	(0.800)
Amhara	-3.429***	-3.281***	-0.978
	(0.359)	(0.407)	(0.682)
Oromia	1.136***	2.225***	-0.563
	(0.392)	(0.455)	(0.698)
Somali	1.811***	2.569***	3.077***
	(0.422)	(0.489)	(0.759)
Beni Gumuz	-0.201	0.720	-0.891
	(0.627)	(0.833)	(0.934)
SNNP	-2.203***	-1.094**	-1.273
	(0.458)	(0.525)	(0.852)
Gambela	-0.992	1.066	-3.540***
	(0.675)	(0.772)	(1.171)
Harar	2.402***	4.628***	-1.531**
	(0.433)	(0.574)	(0.628)
Dire Dawa	3.172***	3.282***	0.450
	(0.414)	(0.577)	(0.705)
Constant	29.67***	26.07***	30.66***
	(0.683)	(0.881)	(1.102)
Observations	9,486	6,272	3,214
R-squared	0.335	0.176	0.370

Robust standard errors are in parentheses; ***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$.

Table A3: Estimates of effect of shocks on RCI

VARIABLES	Pooled	Rural	Urban
Death of a household member	-0.792	0.0731	-1.974**
	(0.562)	(0.650)	(0.996)
Illness	-0.415	0.130	-0.567
	(0.263)	(0.283)	(0.487)
Drought	-3.529***	-1.720***	-1.433***
	(0.305)	(0.310)	(0.030)
Flood	-2.940***	-1.945***	1.774
	(0.649)	(0.634)	(2.125)
Landslide	-0.410	-0.467	-0.895
	(1.330)	(1.429)	(2.770)
Heavy rains	-1.267*	-1.177	-0.754
	(0.760)	(0.746)	(2.378)
Crop damage	-2.362***	-0.902*	-1.411
	(0.522)	(0.505)	(2.023)
Commodity price fall	2.147***	3.668***	-1.327
	(0.816)	(0.749)	(3.314)
Farm input price fall	1.167***	0.772**	0.005***
	(0.345)	(0.349)	(0.002)
Livestock death	-2.262***	-0.604***	-1.696
	(0.395)	(0.013)	(1.712)
House Fire	-1.303	-0.225	-3.055
	(1.510)	(1.748)	(3.431)
Being displaced	3.757	-3.277	3.228
	(2.287)	(3.147)	(1.959)
Household violence	-0.180	-1.464*	-2.423***
	(0.555)	(0.776)	(0.724)
Region FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Constant	23.80***	20.05***	31.63***
	(0.302)	(0.303)	(0.488)
Observations	10,545	6,520	4,025
R-squared	0.146	0.078	0.082

Table A4: Fixed threshold at the level of dimensions

CLASSES THRESHOLDS IN INFORM			
Dimension	CLASS	MAX	MIN
RISK	very high	10	6.5
	high	6.4	5.0
	medium	4.9	3.5
	low	3.4	2.0
	very low	1.9	0.0
HAZARD & EXPOSURE	very high	10.0	6.1
	high	6.0	4.1
	medium	4.0	2.7
	low	2.6	1.5
	very low	1.4	0.0
VULNERABILITY	very high	10.0	6.4
	high	6.3	4.8
	medium	4.7	3.3
	low	3.2	2.0
	very low	1.9	0.0
LACK OF COPING CAPACITY	very high	10.0	7.4
	high	7.3	6.0
	medium	5.9	4.7
	low	4.6	3.2
	very low	3.1	0.0

Source: Marin-Ferrer, M., Vernaccini, L. and Poljansek, K. *Index for Risk Management INFORM Concept and Methodology Report – Version 2017*.

Table A5: A historical account of Ethiopian famines and major food shortages, geographic locations and attributed causes, 1888–2009

Date	Region affected	Attributed causes and severity
1888–92	Ethiopia	Rinderpest affected the cattle population. An estimated 90 percent of livestock lost, and an estimated 2 million dead.
1957–58	Tigray and Wollo	Rain failure in 1957. Locusts and epidemic in 1958.
1964–66	Tigray and Wollo	Not properly documented, but some writers have argued that this crisis was worse than that in 1972–74.
1972–74	Ethiopia	A sequence of rain failures. An estimated quarter million dead and 50 percent of livestock lost in Tigray and Wollo.
1978–79	Southern Ethiopia	Failure of the *belg* rains.
1982	Northern Ethiopia	Late *meher* rains.
1984–85	Ethiopia	A sequence of rain failures. Eight million affected; an estimated 1 million dead, and much livestock loss.
1987–88	Ethiopia	Drought of undocumented severity in peripheral regions.
1990–92	Northern, eastern, and southwestern Ethiopia	Rain failure and regional conflicts. An estimated 4 million people suffered food shortage.
1993–94	Tigray, Wollo, and Addis Ababa	Due to droughts, 4 million people required food assistance, including demobilized army and Somali refugees. New droughts.
1997–2000	Eritrea and northern Tigray	Localized food shortages due to conflict.
1999–2000	Somali region	Food security crisis due to rain failures and decline in prices of livestock, the main source of pastoralists' income.
2002–03	Ethiopia	Drought-induced crop shortages; 12.6 million people were affected.
2008–09	Southern Ethiopia	Localized drought; 6.4 million people were affected.

Source: Graham, J., Rashid, S. and Malek, M. 2013. Disaster Response and Emergency Risk Management in Ethiopia. In: *Food and Agriculture in Ethiopia.* University of Pennsylvania Press.

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